SPECIFICATIONS FOR A HEAVY DUTY AERIAL LADDER
Sealed bids will be received by the City of Jonesboro for the furnishing of all necessary labor, equipment and material for the Fire Apparatus and other equipment as outlined in the following specifications.

INTENT OF SPECIFICATIONS
It shall be the intent of these specifications to cover the furnishing and delivery of a complete fire apparatus. These detailed specifications cover the requirements as to the type of construction, finish, equipment and tests to which the fire apparatus shall conform. Minor details of construction and materials, which are not otherwise specified, are left to the discretion of the contractor.

INSTRUCTIONS TO BIDDERS
The city's standards for bidding automotive fire apparatus must be strictly adhered to, and all bid forms and questions must be complete and submitted with the bid. Omissions and variations shall result in immediate rejection of the bid.

Bids shall only be considered from companies that have an established reputation in the field of fire apparatus construction and have been in business for a minimum of 20 years. Furthermore, in order to insure fair, ethical, and legal competition, neither the original equipment manufacturer (O.E.M.) nor parent company of the O.E.M. shall have ever been fined or convicted of price fixing, bid rigging, or collusion in any domestic or international fire apparatus market.

If a bidder represents more than one fire apparatus company or brands of apparatus, they must only bid the top of the line that meets specification.

Each bidder shall furnish satisfactory evidence of their ability to construct the apparatus specified.

Any apparatus manufacturer or their parent company who has had a performance bond called in the last 10 years, shall not be eligible to bid. Any bids from these manufactures shall be immediately rejected (no exception).

Each bid shall be accompanied by a set of manufacturer's set of specifications consisting of a detailed description of the apparatus, construction methods, and equipment proposed to which the apparatus furnished under contract shall conform. These specifications shall indicate size, type, model and make of all components parts and equipment, providing proof of compliance with each and every item in the departments advertised specifications. A letter only, even though written on company letterhead, shall not be sufficient. An exception to this requirement shall not be acceptable.
In accordance with the current edition of NFPA 1901 standards, the proposal shall specify whether the fire department or apparatus dealership shall provide required loose equipment.

The city will utilize this advertised specification to compare all submitted bid proposals. To facilitate comparison, all bid proposal specifications shall be submitted in the same sequence as the advertised specification. Any bidder who fails to submit a set of bid proposal specifications, or who photo copies and submits these specifications as their own construction details will be considered non responsive. This shall render such proposal ineligible for award.

The city's specification shall, in all cases, govern the construction of the apparatus, unless a properly documented exception or deviation was approved. Any bid indicating that the manufacturer's proposal shall supersede the city's specification will be considered a complete substitute and immediately rejected.

THE CITY HAS THE RIGHT TO REJECT ANY BIDS WHICH DOES NOT MEET THESE SPECIFICATIONS AND IS THE SOLE DECIDER TO DEEM WHICH BID IS IN THE BEST INTEREST OF THE CITY.

EXCEPTIONS
These specifications are based upon design and performance criteria which have been developed by the fire department as a result of extensive research and careful analysis. Subsequently these specifications reflect the only type of fire apparatus that is acceptable at this time and all specifications herein contained are considered as minimum. Therefore exceptions to the specifications may not be accepted.

Bidders shall indicate in the "yes/no" column if their bid complies on each item (paragraph) specified.

If a product brand name is specified and is commercially available to all bidders, an exception to such items is not acceptable and such bid may be rejected.

Exceptions shall be allowed if they are equal to or superior to that specified and provided they are listed and fully explained on a separate page. All deviations, no matter how slight, shall be clearly explained on a separate sheet, in the bid sequence, citing the page and paragraph number(s) of the specifications, how the proposal deviation is different, how the deviation meets or exceeds the specifications and why it is necessary, and entitled "EXCEPTIONS TO SPECIFICATIONS". The buyer reserves the right to require a bidder to provide proof in each case that a substituted item is equal to that specified. The buyer shall be the sole judge in determination of acceptable substitutes.
Proposals that are found to have deviations without listing them or bids taking total exceptions to these advertised specifications will be rejected.

Bids not including all exceptions is a material breach and shall result in the bid being immediately rejected.

**GENERAL DESIGN AND CONSTRUCTION**

The cab, chassis, pump module, and body are to be entirely designed, assembled and painted by the prime vehicle manufacturer, which minimizes third party involvement on engineering, design, service and warranty issues.

All bidders shall provide a list of the company, manufacturing location, and engineering source for each individual major component, including but not limited to the welded cab assembly, the pumphouse module assembly, the chassis assembly, body and electrical system. Apparatus using any subcontracted cab, chassis, pump module, electrical system or body will not be acceptable.

The apparatus shall be designed with due consideration to distribution of load between the front and rear axles. Weight balance and distribution shall be in accordance with the recommendations of the National Fire Protection Association.

The bidder shall make accurate statements as to the apparatus weight and dimensions.

**QUALITY AND WORKMANSHIP**

All steel welding shall follow American welding Society D1.1-2004 recommendations for structural steel welding. All aluminum welding shall follow American welding Society and ANSI D1.2-2003 requirements for structural welding of aluminum. All sheet metal welding shall follow American Welding Society B2.1-2000 requirements for structural welding of sheet metal. Flux core arc welding to use alloy rods, type 7000, American welding Society standards A5.20-E70T1. Employees classified as welders are tested and certified to meet the American Welding Society codes upon hire and every three (3) years thereafter. The manufacturer shall be required to have an American welding Society certified welding inspector in plant during working hours to monitor weld quality.

The manufacturer shall also be certified to operate a Quality Management System under the requirements of ISO 9001. These standards sponsored by the International organization for Standardization (ISO) specify the quality systems that shall be established by the manufacturer for design, manufacture, installation and service. A copy of the certificate of compliance shall be included with the bid.
To demonstrate the quality of the product and service, each bidder shall provide a list of at least twenty five (25) fire departments/municipalities in the region that have bought a second time from the representing dealer. **An exception to this requirement shall not be acceptable.**

**DELIVERY**

Apparatus, to insure proper break in of all components while still under warranty, **shall be delivered under its own power, 400 days or less from the date a purchase order is issued by the City of Jonesboro, AR.** Rail or truck freight shall not be acceptable. A qualified delivery representative shall deliver the apparatus and remain for a sufficient length of time to instruct personnel in proper operation, care and maintenance of the equipment delivered. Bidder will accept a $250.00 per day penalty past the stated delivery date.

**REQUIREMENTS OF THE APPARATUS MANUFACTURER**

The manufacturer of the apparatus must be fully owned and managed by a Parent Company, Corporation, Partnership, or that is a company 100% held in the United States of America.

Proposals from any manufacturer that is fully or partially owned and/or operated by a Foreign Company, Corporation, Partnership, or that is a company under any type of ownership, partnership, or any similar type of agreement will be rejected immediately and their bid disqualified. (NO EXCEPTIONS).

**THIRD PARTY INSPECTION**

The unit will be inspected by a third party contracted by the dealer and agreeable to the department. The third party company shall have experience in the fire apparatus industry. Their credentials will be made available to the fire department upon request. The third party company will also make weekly inspections of the unit during production and provide weekly photos to the department while the truck is under construction from start to finish. **NO EXCEPTIONS.**

**ORIGIN**

Being that the specified truck will be purchased with American tax dollars, the city is requiring that the truck be manufactured in the United States of America by an American owned company. **NO EXCEPTIONS.**

**SERVICE**

Bidder must provide 24 hour emergency service seven days a week by a factory authorized service center. This will include Pump, Diesel engine and transmission mechanics. A sufficient amount of parts inventory must be on hand. Each bidder/dealership must be able to display that
they are actively in the fire apparatus service business by operating a factory authorized service center and parts repository capable of satisfying the warranty service requirements and parts requirements of the vehicle(s) being purchased.

The service center may be no further than 150 miles from the Jonesboro Fire Department and offer mobile service for minor repairs. This will minimize downtime in the event of needed repairs. Location and services provided with an approximate amount of inventory, number of employees, and location shall be provided on a separate page titled “Service”. Service center may be inspected by city prior to placement of the order at the cost of the bidder. A third party service company is not acceptable. NO EXCEPTIONS.

The bidder/dealership must state the location of this authorized service center. This service center must have a staff of factory-trained mechanics, well versed in all aspects of service for all major components of the apparatus.

MANUALS AND SERVICE INFORMATION(115,475),(852,868)
The manufacturer shall supply at time of delivery, complete operation and maintenance manuals covering the complete apparatus as delivered. A permanent plate shall be mounted in the drivers compartment which specifies the quantity and type of fluid required including engine oil, engine coolant, transmission, pump transmission lubrication, pump primer and drive axle.

SAFETY VIDEO
Since video is much more effective than written documentation and can be replayed for new personnel and as a refresher for existing personnel, an apparatus safety video, in DVD format shall be provided at time of delivery. This video shall address key safety considerations for personnel to follow when they are driving, operating, and maintaining the apparatus. Safety procedures for the following shall be included on the video: vehicle pre trip inspection, chassis operation, pump operation and maintenance.

PERFORMANCE TESTS AND REQUIREMENTS
A road test shall be conducted with the apparatus fully loaded and a continuous run of ten (10) miles or more shall be made under all driving conditions, during which time the apparatus shall show no loss of power or overheating. The transmission drive shaft or shafts, and rear axle shall run quietly and be free from abnormal vibration or noise throughout the operating range of the apparatus. Vehicle shall adhere to the following parameters:

A) The apparatus, when fully equipped and loaded, shall have not less than 25 percent nor more than 50 percent of the weight on the front axle, and not less than 50 percent nor more than 75 percent on the rear axle.
B) The apparatus shall be capable of accelerating to 35 mph from a standing start within 25 seconds on a level concrete highway without exceeding the maximum governed rpm of the engine.

C) The service brakes shall be capable of stopping a fully loaded vehicle in 35 feet at 20 mph on a level concrete highway. The air brake system shall conform to Federal Motor vehicle Safety Standards (FMVSS) 121.

D) The apparatus, fully loaded, shall be capable of obtaining a speed of 60 mph on a level concrete highway with the engine not exceeding the governed rpm (full load).

**FAILURE TO MEET TEST**
In the event the apparatus fails to meet the test requirements of these specifications on the first trial, second trials may be made at the option of the bidder within 30 days of the date of the first trial. Such trials shall be final and conclusive and failure to comply with these requirements shall be cause for rejection. Failure to comply with changes to conform to any clause of the specifications, within 30 days after notice is given to the bidder of such changes, shall also be cause for rejection of the apparatus. Permission to keep or store the apparatus in any building owned or occupied by the city or its use by the city during the above-specified period with the permission of the bidder shall not constitute acceptance.

**SERVICE AND WARRANTY SUPPORT (MANUFACTURER)**
To provide an additional layer of service support, the successful manufacturer must also own a least two separate service facilities, one located in the northern portion of the US to service both Canada and the northern US states and one in the south to service the southern states.

The manufacturer shall stock 1 million parts equating to $5,000,000 of inventory dedicated to service and replacement parts to ensure quick response and minimize down time. Furthermore, the manufacturer shall house the inventory in a dedicated facility, with a dedicated shipping area that ensures service parts are given priority. The bidder shall provide detailed documentation of service and replacement part resources.

Parts identification shall be provided to both the dealer and the Fire Department through an on line web based application for the specific truck reflected in this specification. Access will be granted using the specific VIN number of the vehicle. The online web application will provide the ability to view complete bills of materials, digital photographs, parts drawings, assembly drawings, and access to all current operation, maintenance and service publications.

The manufacturer must also maintain a 24 hour/ 7 day a week, toll free emergency hot line. The manufacturer shall employ a staff of adequate size (a minimum of 30 personnel) specifically
educated to providing customer support and parts for the fielded fleet of vehicles it has produced. The manufacturer must be capable of providing both in-house and on-site service for the apparatus.

The manufacturer shall offer regional factory hands-on repair and maintenance training classes.

The manufacturer shall employ a minimum of four certified EVT technicians on staff, not only providing technical expertise in the repair of fire apparatus, but also demonstrating the commitment to service after the sale.

**LIABILITY**

The successful bidder shall defend any and all suits and assume all liability for the use of any patented process including any device or article forming a part of the apparatus or any appliance furnished under the contract. To ensure this will occur, the bidder shall carry the following minimum insurance.

**COMMERCIAL GENERAL LIABILITY INSURANCE**

The successful bidder shall, during the performance of the contract and for three (3) years following acceptance of the product, keep in force at least the following minimum limits of commercial general liability insurance:

- Each Occurrence $1,000,000
- Products/Completed Operations Aggregate $1,000,000
- Personal and Advertising Injury $1,000,000
- General Aggregate $5,000,000

Coverage shall be written on a Commercial General Liability form. The policy shall be written on an occurrence form and shall include Contractual Liability coverage for bodily injury and property damage subject to the terms and conditions of the policy. The policy shall include Owner as an additional insured when required by written contract.

**COMMERCIAL AUTOMOBILE LIABILITY INSURANCE**

The successful bidder shall, during the performance of the contract keep in force at least the following minimum limits of commercial automobile liability insurance:

- Each Accident Combined Single Limit $1,000,000

Coverage shall be written on a Commercial Automobile liability form.
2016:02 Heavy Duty Aerial Ladder Truck Specs.

**UMBRELLA/EXCESS LIABILITY INSURANCE**

The successful bidder shall, during the performance of the contract and for three (3) years following acceptance of the product, keep in force at least the following minimum limits of umbrella liability insurance:

- Aggregate: $25,000,000
- Each Occurrence: $25,000,000

The umbrella policy shall be written on an occurrence basis and at a minimum provide excess to the Bidder's General Liability, Automobile Liability and Employer's Liability policies.

The required limits can be provided by one (1) or more policies provided all other insurance requirements are met.

Coverage shall be provided by a carrier(s) rated A- or better by A.M. Bests.

All policies shall provide a 30 day notice of cancellation to the named insured. The Certificate of Insurance shall provide the following cancellation clause: Should any of the above described policies be cancelled before the expiration date thereof, notice shall be delivered in accordance with the policy provisions. Bidder agrees to furnish owner with a current Certificate of Insurance with the coverages listed above along with its bid. The certificate shall show the city as certificate holder.

**SINGLE SOURCE MANUFACTURER**

Bids shall only be accepted from a single source apparatus manufacturer. The definition of single source is a manufacturer that designs and manufactures their products using an integrated approach, including the chassis, cab weldment, cab, pump house (including the sheet metal enclosure, valve controls, piping and operators panel) body and aerial device being designed, fabricated and assembled on the bidder's premises. The electrical system (hardwire or multiplex) shall be both designed and integrated by the same apparatus manufacturer. The warranties relative to these major components (excluding component warranties such as engine, transmission, axles, pump, etc.) must be from a single source manufacturer and not split between manufacturers (i.e. body, pump house, cab weldment, chassis and aerial). The bidder shall provide evidence that they comply with this requirement.

The bidder shall state the location of the factory where the apparatus is to be built.
NFPA 2009 STANDARDS
This unit shall comply with the NFPA standards effective January 1, 2009, except for fire department specifications that differ from NFPA specifications. These exceptions shall be set forth in the Statement of Exceptions.

Certification of slip resistance of all stepping, standing and walking surfaces shall be supplied with delivery of the apparatus.

A plate that is highly visible to the driver while seated shall be provided. This plate shall show the overall height, length, and gross vehicle weight rating.

The manufacturer shall have programs in place for training, proficiency testing and performance for any staff involved with certifications.

An official of the company shall designate, in writing, who is qualified to witness and certify test results.

NFPA COMPLIANCE
Apparatus proposed by the bidder shall meet the applicable requirements of the National Fire Protection Association (NFPA) as stated in current edition at time of contract execution. Fire department's specifications that differ from NFPA specifications shall be indicated in the proposal as "non-NFPA".

VEHICLE INSPECTION PROGRAM CERTIFICATION
To assure the vehicle is built to current NFPA standards, the apparatus, in its entirety, shall be third-party, independent, audit-certified through Underwriters Laboratory (UL) that it is built and complies to all applicable standards in the current edition of NFPA 1901. The certification includes: all design, production, operational, and performance testing of not only the apparatus, but those components that are installed on the apparatus (no exception).

A placard shall be affixed in the driver's side area stating the third party agency, the date, the standard and the certificate number of the whole vehicle audit.

INSPECTION CERTIFICATE
A third party inspection certificate for the aerial device shall be furnished upon delivery of the aerial device. The certificate shall be Underwriters Laboratories Inc. Type 1 and shall indicate that the aerial device has been inspected on the production line and after final assembly.

Visual structural inspections shall be performed on all welds on both aluminum and steel ladders.

On critical weld areas, or on any suspected defective area, the following tests shall be conducted:
**Magnetic particle inspection** shall be conducted on steel aerials to assure the integrity of the weldments and to detect any flaws or weaknesses. Magnets shall be placed on each side of the weld while iron powder is placed on the weld itself. The powder shall detect any crack that may exist. This test shall conform to ASTM E709 and be performed prior to assembly of the aerial device.

- **A liquid penetrant test** shall be conducted on aluminum aerials to assure the integrity of the weldments and to detect any flaws or weaknesses. This test shall conform to ASTM E165 and be performed prior to assembly of the aerial device.

- **Ultrasonic inspection** shall be conducted on all aerials to detect any flaws in pins, bolts and other critical mounting components.

In addition to the tests above, functional tests, load tests, and stability tests shall be performed on all aerials. These tests shall determine any unusual deflection, noise, vibration, or instability characteristics of the unit.

**PUMP TEST**
The pump shall be tested, approved and certified by Underwriter's Laboratory at the manufacturer's expense. The test results and the pump manufacturer's certification of hydrostatic test; the engine manufacturer's certified brake horsepower curve; and the manufacturer's record of pump construction details shall be forwarded to the Fire Department.

**GENERATOR TEST**
The generator shall be tested, approved, and certified by Underwriters Laboratories at the manufacturer's expense. The test results shall be provided to the Fire Department at the time of delivery.

**REQUIREMENTS OF THE APPARATUS MANUFACTURER**
The manufacturer of the apparatus must be fully owned and managed by a Parent Company, Corporation, Partnership, or that is a company 100% held in the United States of America.

Proposals from any manufacturer that is fully or partially owned and/or operated by a Foreign Company, Corporation, Partnership, or that is a company under any type of ownership, partnership, or any similar type of agreement shall be rejected immediately and their bid disqualified. (NO EXCEPTIONS).

**INSPECTION TRIP(S)**
The bidder shall provide two (2) factory inspection trips for three customer representatives on each trip. The inspection trips shall be scheduled at times mutually agreed upon between the
manufacturer's representative and the customer. All costs such as travel, lodging and meals shall be the responsibility of the bidder.

**AFTERMARKET SUPPORT WEBSITE**

A Customer Service website shall provide authorized dealers access to comprehensive information pertaining to the maintenance and service of their customer's apparatus. This tool shall provide the authorized dealer the ability to service and support their customers to the best of their ability with factory support at their fingertips.

This website shall also be accessible to the end user through the guest login. Limited access is available and vehicle specific parts information accessible by entering a specific VIN number. All end users should see their local authorized dealer for additional support and service.

The website shall provide the following to the designated individuals:

- Authorized dealer only - ability to access truck detail information on the major components of the vehicle, warranty information, available vehicle photographs, vehicle drawings, sales options, applicable vehicle software downloads, etc.

- Authorized dealer and customer - parts look-up capability, with the aid of digital photographs, part drawings, and assembly drawings.

- Authorized dealer only - ability to electronically submit warranty claims directly to the factory for reimbursement.

- Authorized dealer only - accessibility to multiple dealer reports that allow the dealership to maintain communication with the customer on the status of orders, claims, and phone contacts.

- Authorized dealer and customer - access to all currently published Operation and Maintenance and Service publications.

- Authorized dealer only - access to manufacturer Service Bulletins and Work Instructions containing information on current service topics and recommendations provided.

- Authorized dealer and customer - access to upcoming training classes offered by the manufacturer.

- Authorized dealer only - access to interactive electronic learning modules (Operators Guides) covering the operation of major vehicle components.
BID BOND
All bidders shall provide a bid bond as security for the bid in the form of a 10% bid bond to accompany their bid. This bid bond shall be issued by a Surety Company who is listed on the U.S. Treasury Departments list of acceptable sureties as published in Department Circular 570. The bid bond shall be issued by an authorized representative of the Surety Company and shall be accompanied by a certified power of attorney dated on or before the date of bid. The bid bond shall include language, which assures that the bidder/principal shall give a bond or bonds as may be specified in the bidding or contract documents, with good and sufficient surety for the faithful performance of the contract, including the Basic One (1) Year Limited Warranty, and for the prompt payment of labor and material furnished in the prosecution of the contract.

Proposals received from bidders who do not manufacture the chassis shall provide a warranty that shall be issued jointly and severally by, and signed by, both the bidder and the chassis manufacturer.

If the successful bidder does not manufacture the chassis, the bidder shall supply a warranty bond, in addition to their performance bond, along with their signed contract. This warranty bond shall guarantee all terms and conditions of the Basic One (1) Year Limited Warranty and names both the bidder and chassis manufacturer as co-principals. This warranty bond shall be issued for the contract amount and shall remain in force for a term which is consistent with the term of the Basic One (1) Year Limited Warranty.

Notwithstanding any document or assertion to the contrary, any surety bond related to the sale of a vehicle shall apply only to the Basic One (1) Year Limited Warranty for such vehicle. Any surety bond related to the sale of a vehicle shall not apply to any other warranties that are included within this bid (OEM or otherwise) or to the warranties (if any) of any third party of any part, component, attachment or accessory that is incorporated into or attached to the vehicle. In the event of any contradiction or inconsistency between this provision and any other document or assertion, this provision shall prevail.

PERFORMANCE BOND NOT REQUESTED
A performance bond shall not be included. If requested at a later date, one shall be provided to you for an additional cost and the following shall apply:

The successful bidder shall furnish a Performance and Payment bond (Bond) equal to 100 percent of the total contract amount within 30 days of the notice of award. Such Bond shall be in a form acceptable to the Owner and issued by a surety company included within the Department
of Treasury's Listing of Approved Sureties (Department Circular 570) with a minimum A.M. Best Financial Strength Rating of A and Size Category of XV. In the event of a bond issued by a surety of a lesser Size Category, a minimum Financial Strength rating of A+ is required.

Bidder and Bidder's surety agree that the Bond issued hereunder, whether expressly stated or not, also includes the surety's guarantee of the vehicle manufacturer's Bumper to Bumper warranty period included within this proposal. Owner agrees that the penal amount of this bond shall be simultaneously amended to 25 percent of the total contract amount upon satisfactory acceptance and delivery of the vehicle(s) included herein. Notwithstanding anything contained within this contract to the contrary, the surety's liability for any warranties of any type shall not exceed three (3) years from the date of such satisfactory acceptance and delivery, or the actual Bumper to Bumper warranty period, whichever is shorter.

**APPROVAL DRAWING**
A drawing of the proposed apparatus shall be provided for approval before construction begins. The sales representative shall also have a copy of the same drawing. The finalized and approved drawing shall become part of the contract documents. This drawing shall indicate the chassis make and model, location of the lights, siren, horns, compartments, major components, etc.

A "revised" approval drawing of the apparatus shall be prepared and submitted by the manufacturer to the city showing any changes made to the approval drawing.

**ELECTRICAL WIRING DIAGRAMS**
Two (2) electrical wiring diagrams, prepared for the model of chassis and body, shall be provided.

**CHASSIS**
The chassis provided shall be a new, tilt-type custom fire apparatus. The chassis shall be manufactured in the apparatus body builder's facility, eliminating any split responsibility. The chassis shall be designed and manufactured for heavy-duty service, with adequate strength and capacity for the intended load to be sustained and the type of service required.

**WHEELBASE**
The wheelbase of the vehicle shall be no greater than 234.00".

**GVW RATING**
The gross vehicle weight rating shall be a minimum of 57,500.

**FRAME**
The chassis frame shall be built with two (2) steel channels bolted to five (5) cross members or more, depending on other options of the apparatus.
The side rails shall have a 13.38" tall web over the front and mid sections of the chassis, with a continuous smooth taper to 10.75" over the rear axle.

Each rail shall have a section modulus of 25,992 cubic inches and a resisting bending moment (rbm) of 3,119,040 in-lb over the critical regions of the frame assembly, with a section modulus of 18.96 cubic inches with an rbm of 2,275,200 in-lb over the rear axle.

The frame rails shall be constructed of 120,000 psi yield strength heat-treated 0.38" thick steel with 3.50" wide flanges.

**FRAME LINER**

A full-length mainframe liner shall be provided.

The liner shall be an inverted "L" design that transitions to an internal "C" design towards the rear of the liner. It shall be heat-treated steel measuring 12.00" x 3.00" x .25" through the "L" portion of the liner transitioning to 9.38" x 3.00" x .25" through the "C" portion of the liner.

Each liner shall have a section modulus of 7.795 cubic inches, yield strength of 110,000 psi, and rbm of 857,462 in-lb. Total rbm at wheelbase center shall be 3,976,502 in-lb.

**FRONT NON DRIVE AXLE**

The front axle shall be of the independent suspension design with a ground rating of 24,000 lb.

Upper and lower control arms shall be used on each side of the axle. Upper control arm castings shall be made of 100,000-psi yield strength 8630 steel and the lower control arm casting shall be made of 55,000-psi yield ductile iron.

The center cross members and side plates shall be constructed out of 80,000-psi yield strength steel.

Each control arm shall be mounted to the center section using elastomer bushings. These rubber bushings shall rotate on low friction plain bearings and be lubricated for life. Each bushing shall also have a flange end to absorb longitudinal impact loads, reducing noise and vibrations.

There shall be nine (9) grease fittings supplied, one (1) on each control arm pivot and one (1) on the steering gear extension.

The upper control arm shall be shorter than the lower arm so that wheel end geometry provides positive camber when deflected below rated load and negative camber above rated load.

Camber at load shall be zero degrees for optimum tire life.
The ball joint bearing shall be of low friction design and be maintenance free.

Toe links that are adjustable for alignment of the wheel to the center of the chassis shall be provided.

The wheel ends must have little to no bump steer when the chassis encounters a hole or obstacle.

The steering linkage shall provide proper steering angles for the inside and outside wheel, based on the vehicle wheelbase.

The axle shall have a third party certified turning angle of 45 degrees. Front discharge, front suction, or aluminum wheels shall not infringe on this cramp angle.

**FRONT SUSPENSION**

Front independent suspension shall be provided with a minimum ground rating of 24,000 lb.

The independent suspension system shall be designed to provide maximum ride comfort. The design shall allow the vehicle to travel at highway speeds over improved road surfaces and at moderate speeds over rough terrain with minimal transfer of road shock and vibration to the vehicle's crew compartment.

Each wheel shall have a torsion bar type spring. In addition, each front wheel end shall also have energy absorbing jounce bumpers to prevent bottoming of the suspension.

The suspension design shall be such that there is at least 10.00" of total wheel travel and a minimum of 3.75" before suspension bottoms.

The torsion bar anchor lock system allows for simple lean adjustments, without the use of shims. One can adjust for a lean within fifteen minutes per side. Anchor adjustment design is such that it allows for ride height adjustment on each side.

The independent suspension shall have gone through a durability test that simulated a minimum of 140,000 miles of inner city driving.

**FRONT SHOCK ABSORBERS**

KONI heavy-duty telescoping shock absorbers shall be provided on the front suspension.

**FRONT OIL SEALS**

Oil seals with viewing window shall be provided on the front axle.
FRONT TIRES
Front tires shall be Goodyear 425/65R22.50 radials, 20 ply G296 tread, rated for 24,400 lb maximum axle load and 68 mph maximum speed.

The tires shall be mounted on 22.50" x 12.25" steel disc type wheels with a ten (10)-stud, 11.25" bolt circle.

REAR AXLE
The rear axle shall be a Meritor™, Model RS-30-185, with a capacity of 33,500 lb.

TOP SPEED OF VEHICLE
A rear axle ratio shall be furnished to allow the vehicle to reach a top speed of 60 mph.

REAR SUSPENSION
The rear suspension shall be Standens, semi-elliptical, 3.00" wide x 53.00" long, with a ground rating of 33,500 lb. The spring hangers shall be castings.

The two (2) top leaves shall wrap the forward spring hanger pin, and the rear of the spring shall be a slipper style end that shall ride in a rear slipper hanger. To reduce bending stress due to acceleration and braking, the front eye shall be a berlin eye that shall place the front spring pin in the horizontal plane within the main leaf.

A steel encased rubber bushing shall be used in the spring eye. The steel encased rubber bushing shall be maintenance free and require no lubrication.

REAR OIL SEALS
Oil seals shall be provided on the rear axle(s).

REAR TIRES
Rear tires shall be four (4) Goodyear 315/80R22.50 radials with 20 ply G289 WHA tread, rated for 36,360 lb maximum axle load and 68 mph maximum speed.

The tires shall be mounted on 22.50" x 9.00" steel disc type wheels with a ten (10) stud, 11.25" bolt circle.

TIRE BALANCE
All tires shall be balanced with Counteract balancing beads. The beads shall be inserted into the tire and eliminate the need for wheel weights.

TIRE PRESSURE MANAGEMENT
There shall be a tire pressure management system provided that shall monitor each tires pressure and temperature. A 7.00" resistive touch screen located in the cab instrument panel shall indicate
each tires position, pressure and temperature. A wireless sensor shall be mounted to each wheel for a total of six (6) sensors.

The system shall have three (3) alert levels:

- Critical Low Pressure Alert
- Pressure Deviation Alert
- High Temperature Alert

Each alert shall trigger an audible alarm and an indicator light within the gauge to signal the driver of the problem.

The system shall be covered by a five (5) year parts and labor warranty. Please see warranty document for details.

**FRONT HUB COVERS**
Stainless steel hub covers shall be provided on the front axle. An oil level viewing window shall be provided.

**REAR HUB COVERS**
A pair of stainless steel high hat hub covers shall be provided on rear axle hubs.

**AUTOMATIC TIRE CHAINS**
One (1) pair of Onspot automatic tire chains shall be provided at the rear. System shall be electric over air operated with locking switch on cab instrument panel. System to be operable at speeds up to 35 mph.

**CHROME LUG NUT COVERS**
Chrome lug nut covers shall be supplied on front and rear wheels.

**MUD FLAPS**
Mud flaps shall be installed behind the front and rear wheels of the apparatus.

**WHEEL CHOCKS**
There shall be one (1) pair of folding Ziamatic, Model SAC-44-E, aluminum alloy, Quick-Choc wheel blocks with easy-grip handle provided.

**WHEEL CHOCT BRACKETS**
There shall be one (1) pair of Zico, Model SQCH-44-H, horizontal mounting wheel chock brackets provided for the Ziamatic, Model SAC-44-E, folding wheel chocks. The brackets shall
be made of aluminum and consist of a quick release spring loaded rod to hold the wheel chocks in place. Mounting bracket location shall be determined during final inspection.

**ANTI-LOCK BRAKE SYSTEM**
The vehicle shall be equipped with a Meritor WABCO 4S4M, anti-lock braking system. The ABS shall provide a 4-channel anti-lock braking control on both the front and rear wheels. A digitally controlled system that utilizes microprocessor technology shall control the anti-lock braking system. Each wheel shall be monitored by the system. When any particular wheel begins to lockup, a signal shall be sent to the control unit. This control unit shall then reduce the braking of that wheel for a fraction of a second and then reapply the brake. This anti-lock brake system shall eliminate the lockup of any wheel thus helping to prevent the apparatus from skidding out of control.

**BRAKES**
The service brake system shall be full air type.

The front brakes shall be Knorr/Bendix disc type with a 17.00" ventilated rotor for improved stopping distance.

The brake system shall be certified, third party inspected, for improved stopping distance.

The rear brakes shall be Meritor™ 16.50" x 8.63" cam operated with automatic slack adjusters.

**AIR COMPRESSOR, BRAKE SYSTEM**
The air compressor shall be a Bendix®, Model BA-921, with 15.80 cubic feet per minute output at 1,250 rpm.

**BRAKE SYSTEM**
The brake system shall include:

- Bendix® dual brake treadle valve with vinyl covered foot surface
- Heated automatic moisture ejector on air dryer
- Total air system capacity of 5,198 cubic inches
- Two (2) air pressure gauges with a red warning light and an audible alarm, that activates when air pressure falls below 60 psi
- Spring set parking brake system
- Parking brake operated by a push-pull style control valve
- A parking "brake on" indicator light on instrument panel
- Park brake relay/inversion and anti-compounding valve, in conjunction with a double check valve system, with an automatic spring brake application at 40 psi
2016:02 Heavy Duty Aerial Ladder Truck Specs.

- A pressure protection valve to prevent all air operated accessories from drawing air from the air system when the system pressure drops below 80 psi (550 kPa)

The air tank shall be primed and painted to meet a minimum 750 hour salt spray test.

To reduce the effects of corrosion, the air tank shall be mounted with stainless steel brackets (no exception).

**BRAKE SYSTEM AIR DRYER**
The air dryer shall be WABCO System Saver 1200 with spin-on coalescing filter cartridge and 100 watt heater.

**BRAKE LINES**
Color-coded nylon brake lines shall be provided. The lines shall be wrapped in a heat protective loom where necessary in the chassis.

**AIR INLET**
One (1) air inlet with male coupling shall be provided. It shall allow station air to be supplied to the apparatus brake system through a shoreline hose. The inlet shall be located in the driver side lower step well of cab. A check valve shall be provided to prevent reverse flow of air. The inlet shall discharge into the "wet" tank of the brake system. A mating female coupling shall also be provided with the loose equipment.

**ALL WHEEL LOCK-UP**
An additional all wheel lock-up system shall be installed which applies air to the front brakes only. The standard spring brake control valve system shall be used for the rear.

**ENGINE**
The chassis shall be powered by an electronically controlled engine as described below:

<table>
<thead>
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<th>Make:</th>
<th>Detroit™</th>
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<tr>
<td>Model:</td>
<td>DD13®</td>
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<tr>
<td>Power:</td>
<td>505 hp at 1625 rpm</td>
</tr>
<tr>
<td>Torque:</td>
<td>1750 lb-ft at 1075 rpm</td>
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<tr>
<td>Governed Speed:</td>
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<tr>
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<td>EPA 2016 (GHG17)</td>
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<tr>
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<td>Diesel</td>
</tr>
<tr>
<td>Cylinders:</td>
<td>Six (6)</td>
</tr>
<tr>
<td>Displacement:</td>
<td>781 cubic inches (12.8L)</td>
</tr>
</tbody>
</table>
The engine shall include On-board diagnostics (OBD), which provides self diagnostic and reporting. The system shall give the owner or repair technician access to state of health information for various vehicle sub systems. The system shall monitor vehicle systems, engine and after treatment. The system shall illuminate a malfunction indicator light on the dash console if a problem is detected.

**HIGH IDLE**
A high idle switch shall be provided, inside the cab, on the instrument panel, that shall automatically maintain a preset engine rpm. A switch shall be installed, at the cab instrument panel, for activation/deactivation.

The high idle shall be operational only when the parking brake is on and the truck transmission is in neutral. A green indicator light shall be provided, adjacent to the switch. The light shall illuminate when the above conditions are met. The light shall be labeled "OK to Engage High Idle."

**ENGINE BRAKE**
A Jacobs® engine brake is to be installed with the controls located on the instrument panel within easy reach of the driver.

The driver shall be able to turn the engine brake system on/off and have a high, medium and low setting.

The engine brake shall be installed in such a manner that when the engine brake is slowing the vehicle the brake lights are activated.

The ABS system shall automatically disengage the auxiliary braking device when required.

**CLUTCH FAN**
A Horton® fan clutch shall be provided. The fan clutch shall be automatic when the pump transmission is in "Road" position, and fully engaged in "Pump" position.

**ENGINE AIR INTAKE**
An air intake with an ember separator (to prevent road dirt, burning embers, and recirculating hot air from entering the engine) shall be mounted at the front of the apparatus, on the passenger side of the engine.
The ember separator shall be mounted in the air intake with flame retardant, roto-molded polyethylene housing. It shall be easily accessible by the hinged access panel at the front of the vehicle.

**EXHAUST SYSTEM**
The exhaust system shall include a diesel particulate filter (DPF) and a selective catalytic reduction (SCR) device to meet current EPA standards. The exhaust system shall be stainless steel from the turbo to the inlet of the SCR device and shall be 5.00" in diameter. An insulation wrap shall be provided on all exhaust pipes between the turbo and SCR to minimize the transfer of heat to the cab. The exhaust shall terminate horizontally ahead of the passenger side rear wheels. A tailpipe diffuser shall be provided to reduce the temperature of the exhaust as it exits. Heat deflector shields shall be provided to isolate chassis and body components from the heat of the tailpipe diffuser.

**RADIATOR**
The radiator and the complete cooling system shall meet or exceed NFPA and engine manufacturer cooling system standards.

For maximum corrosion resistance and cooling performance, the entire radiator core shall be constructed using long life aluminum alloy. The core shall be made of aluminum fins, having a serpentine design, brazed to aluminum tubes. The tubes shall be brazed to aluminum headers. No solder joints or leaded material of any kind shall be acceptable in the core assembly. The radiator core shall have a minimum frontal area of 1434 square inches. Supply and return tanks made of glass-reinforced nylon shall be crimped on to the core assembly using header tabs and a compression gasket to complete the radiator core assembly. The radiator shall be compatible with commercial antifreeze solutions.

There shall be a full steel frame around the entire radiator core assembly. The radiator core assembly shall be isolated within the steel frame by rubber inserts to enhance cooling system durability and reliability. The radiator shall be mounted in such a manner as to prevent the development of leaks caused by twisting or straining when the apparatus operates over uneven ground. The radiator assembly shall be isolated from the chassis frame rails with rubber isolators.

The radiator assembly shall include an integral deaeration tank permanently mounted to the top of the radiator framework, with a readily accessible remote-mounted overflow tank. For visual coolant level inspection, the radiator shall have a built-in sight glass. The radiator shall be equipped with a 15 psi pressure relief cap.
A drain port shall be located at the lowest point of the cooling system and/or the bottom of the radiator to permit complete flushing of the coolant from the system.

A heavy-duty fan shall draw in fresh, cool air through the radiator. Shields or baffles shall be provided to prevent recirculation of hot air to the inlet side of the radiator.

**COOLANT LINES**

Gates® silicone hoses shall be used for all engine/heater coolant lines installed by the chassis manufacturer.

The chassis manufacturer shall also use Gates brand hose on other heater, defroster and auxiliary coolant circuits. There shall be some areas in which an appropriate Gates product is not available. In those instances, a comparable silicone hose from another manufacturer shall be used.

Hose clamps shall be stainless steel "constant torque type" to prevent coolant leakage. They shall react to temperature changes in the cooling system and expand or contract accordingly while maintaining a constant clamping pressure on the hose.

**FUEL TANK**

A 65 gallon fuel tank shall be provided and mounted at the rear of the chassis. The tank shall be constructed of 12-gauge, hot rolled steel. It shall be equipped with swash partitions and a vent. To eliminate the effects of corrosion, the fuel tank shall be mounted with stainless steel straps (no exception).

A 0.75" drain plug shall be provided in a low point of the tank for drainage.

A fill inlet shall be located on the left hand side of the body and be covered with a hinged, spring loaded, stainless steel door that is marked "Ultra Low Sulfur - Diesel Fuel Only."

A 0.50" diameter vent shall be provided running from top of tank to just below fuel fill inlet.

The tank shall meet all FHWA 393.67 requirements including a fill capacity of 95 percent of tank volume.

All fuel lines shall be provided as recommended by the engine manufacturer.

**DIESEL EXHAUST FLUID TANK**

A 4.5 gallon diesel exhaust fluid (DEF) tank shall be provided and mounted in the driver's side body forward of the rear axle.

A 0.50" drain plug shall be provided in a low point of the tank for drainage.
A fill inlet shall be located on the driver's side of the body and be covered with a hinged, spring loaded, polished stainless steel door that is marked "Diesel Exhaust Fluid Only".

The tank shall meet the engine manufacturers requirement for 10 percent expansion space in the event of tank freezing.

The tank shall include an integrated heater unit that utilizes engine coolant to thaw the DEF in the event of freezing.

**FUEL COOLER**
An air to fuel cooler shall be installed in the engine fuel return line.

**TRANSMISSION**
An Allison 5th generation, Model EVS 4000P, electronic, torque converting, automatic transmission shall be provided.

The transmission shall be equipped with prognostics to monitor oil life, filter life, and transmission health. A wrench icon on the shift selector's digital display shall indicate when service is due.

Two (2) PTO openings shall be located on left side and top of converter housing (positions 8 o'clock and 1 o'clock).

A transmission temperature gauge with red light and buzzer shall be installed on the cab instrument panel.

**TRANSMISSION SHIFTER**
A six (6)-speed push button shift module shall be mounted to right of driver on console. Shift position indicator shall be indirectly lit for after dark operation.

The transmission ratio shall be:

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<thead>
<tr>
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<tbody>
<tr>
<td>1st</td>
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<tr>
<td>R</td>
<td>4.80 to 1.00</td>
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</table>
TRANSMISSION COOLER
A Modine plate and fin transmission oil cooler shall be provided using engine coolant to control the transmission oil temperature.

DRIVELINE
Drivelines shall be a heavy-duty metal tube and be equipped with Spicer® 1810 universal joints.

The shafts shall be dynamically balanced before installation.

A splined slip joint shall be provided in each driveshaft. The slip joint shall be coated with Glidecoat® or equivalent.

STEERING
Dual Sheppard, Model M110, steering gears, with integral heavy-duty power steering, shall be provided. For reduced system temperatures, the power steering shall incorporate an air to oil cooler and an Eaton, Model VN20, hydraulic pump with integral pressure and flow control. All power steering lines shall have wire braded lines with crimped fittings.

A tilt and telescopic steering column shall be provided to improve fit for a broader range of driver configurations.

STEERING WHEEL
The steering wheel shall be 18.00" in diameter, have tilting and telescoping capabilities, and a 4-spoke design.

BUMPER
A one (1) piece, ten (10) gauge, 304-2B type polished stainless steel bumper, a minimum of 10.00" high, shall be attached to a bolted modular extension frame constructed of 50,000 psi tensile steel "C" channel mounted directly behind it to provide adequate support strength.

The bumper shall be extended 22.00" from front face of cab.

Documentation shall be provided, upon request, to show that the options selected have been engineered for fit-up and approval for this modular bumper extension. A chart shall be provided to indicate the option locations and shall include, but not be limited to, the following options: air horns, mechanical sirens, speakers, hose trays (with hose capacities), winches, lights, discharge, and suction connections.
**GRAVEL PAN**
A gravel pan, constructed of bright aluminum treadplate, shall be furnished between the bumper and cab face. The gravel pan shall be properly supported from the underside to prevent flexing and vibration of the aluminum treadplate.

**CENTER HOSE TRAY**
A hose tray, constructed of aluminum, shall be placed in the center of the bumper extension.

The tray shall have a capacity of 150' of 1.75” double jacket cotton-polyester hose.

Black rubber grating shall be provided at the bottom of the tray. Drain holes are also provided.

**HOSE TRAY COVER**
A bright aluminum treadplate cover shall be provided over the center hose tray. The cover shall be raised 1.50” above the gravel pan.

The cover shall be attached with a stainless steel hinge.

A lift and turn latch shall secure the cover in the closed position and a mechanical stay arm shall hold the cover in the open position.

**LIFT AND TOW MOUNTS**
Mounted to the frame extension shall be lift and tow mounts. The lift and tow mounts shall be designed and positioned to adapt to certain tow truck lift systems.

The lift and tow mounts with eyes shall be painted the same color as the frame.

**TOW HOOKS**
No tow hooks are to be provided. This truck shall be equipped with a lift and tow package with integral tow eyes.

**CAB**
The cab shall be designed specifically for the fire service and shall be manufactured by the chassis builder.

To provide quality at the source and single source customer support, the cab shall be built by the apparatus manufacturer in a facility located on the manufacturer's premises (no exception).

For reasons of structural integrity and enhanced occupant protection, the cab shall be of heavy duty design, constructed to the following minimal standards.
The cab shall have 12 main vertical structural members located in the A-pillar (front cab corner posts), B-pillar (side center posts), C-pillar (rear corner posts) and rear wall areas. The A-pillar shall be constructed of 0.25" heavy wall extrusions joined by a solid A356-T6 aluminum joint casting. The B-pillar and C-pillar shall also be constructed from 0.25" heavy wall extrusions. The rear wall shall be constructed of two (2) 4.00" x 2.00" outer aluminum extrusions and two (2) 3.00" x 2.00" inner aluminum extrusions. All main vertical structural members shall run from the floor to 7.50" x 3.50" x 0.125" thick roof extrusions to provide a cage-like structure with the A-pillar and roof extrusions being welded into a 0.75" thick corner casting at each of the front corners of the roof assembly.

The front of the cab shall be constructed of a 0.25" thick firewall, covered with a 0.125" front skin (for a total thickness of 0.38"), and reinforced with 24.50" wide x 10.00" deep x 0.50" thick supports on each side of the engine tunnel. The cross-cab support shall be welded to the A-pillar, 0.25" firewall, and engine tunnel, on the left and right sides.

The cab floors shall be constructed of 0.1875" thick aluminum plate and reinforced at the firewall with an additional 0.25" thick cross-floor support providing a total thickness of 0.44" of structural material at the front floor area. The front floor area shall also be supported with three (3) 0.50" plates bolted together that also provides the mounting point for the cab lift. This tubing shall run from the front of the cab to the 0.1875" thick engine tunnel, creating the structure to support the forces created when lifting the cab.

The cab shall be a full-tilt style. A 3-point cab mount system with rubber isolators shall improve ride quality by isolating chassis vibrations from the cab.

The crew cab shall be a totally enclosed design with the interior area completely open to improve visibility and verbal communication between the occupants.

The overall height (from the cab roof to the ground) shall be approximately 102.00". The overall height listed shall be calculated based on a truck configuration with the lowest suspension weight ratings, the smallest diameter tires for the suspension, no water weight, no loose equipment weight, and no personnel weight. Larger tires, wheels, and suspension shall increase the overall height listed.

The cab shall have an interior width of not less than 93.50". The driver and passenger seating positions shall have a minimum 24.00" clear width at knee level.

To reduce injuries to occupants in the seated positions, proper head clearance shall be provided. The floor-to-ceiling height inside the forward cab shall be no less than 60.25". The floor-to-
ceiling height inside the crew cab shall be no less than 52.95" in the center position and 58.75" in the outboard positions.

The crew cab shall measure a minimum of 57.50" from the rear wall to the backside of the engine tunnel (knee level) for optimal occupant legroom.

**INTERIOR CAB INSULATION**
The cab walls, ceiling and engine tunnel shall be insulated in all strategic locations to maximize acoustic absorption and thermal insulation. The cab shall be insulated with 2.00" insulation in the rear wall, 3.00" insulation in the side walls, and 1.50" insulation in the ceiling.

**FENDER LINERS**
Full-circular, aluminum inner fender liners in the wheel wells shall be provided.

**PANORAMIC WINDSHIELD**
A one (1)-piece, safety glass windshield with more than 2,802 square inches of clear viewing area shall be provided. The windshield shall be full width and shall provide the occupants with a panoramic view. The windshield shall consist of three (3) layers: the outer light, the middle safety laminate, and the inner light. The 0.114" thick outer light layer shall provide superior chip resistance. The middle safety laminate layer shall prevent the windshield glass pieces from detaching in the event of breakage. The inner light shall provide yet another chip resistant layer. The cab windshield shall be bonded to the aluminum windshield frame using a urethane adhesive. A custom frit pattern shall be applied on the outside perimeter of the windshield for a finished automotive appearance.

**WINDSHIELD WIPERS**
Three (3) electric windshield wipers with a washer, in conformance with FMVSS and SAE requirements, shall be provided. The wiper blades shall be 21.65" long and together shall clear a minimum of 1,783 square inches of the windshield for maximum visibility in inclement weather.

The windshield washer fluid reservoir shall be located at the front of the vehicle and be accessible through the access hood for simple maintenance.

**FAST SERVICE ACCESS FRONT TILT HOOD**
A full-width access hood shall be provided for convenient access to engine coolant, steering fluid, wiper fluid, cab lift controls, headlight power modules, and ember separator. The hood shall also provide complete access to the windshield wiper motor and components. The hood shall be contoured to provide a sleek, automotive appearance. The hood shall be constructed of two (2) fiberglass panels bonded together and shall include reinforcing ribs for structural integrity. The hood shall include air cylinders to hold the hood in open and closed positions, and
a heavy duty latch system that shall meet FMVSS 113 (Hood Latch System). The spring-loaded hood latch shall be located at the center of the hood with a double-action release lever located behind the upper grille. The two (2)-step release requires the lever first be pulled to the driver side until the hood releases from the first latch (primary latch) then to the passenger side to fully release the hood (secondary latch).

**ENGINE TUNNEL**
To provide structural strength, the engine tunnel sidewalls shall be constructed of 0.50" aluminum plate that is welded to both the 0.25" firewall and 0.38" heavy wall extrusion under the crew cab floor. To maximize occupant space, the top edges shall be tapered.

The back of the engine tunnel shall be no higher than 16.25" off the crew cab floor (no exception).

The engine tunnel shall be insulated on both sides for thermal and acoustic absorption. The underside of the tunnel shall be covered with 1.00" thick polyether foam that is reinforced with an aluminized face. Thermal rating for this insulation shall be -40 degrees Fahrenheit to 300 degrees Fahrenheit. The insulation shall keep noise (dBA) levels at or lower than the specifications in the current edition of the NFPA 1901 standards.

**CAB REAR WALL EXTERIOR COVERING**
The exterior surface of the rear wall of the cab shall be overlaid with bright aluminum treadplate except for areas that are not typically visible when the cab is lowered.

**CAB LIFT**
A hydraulic cab lift system shall be provided, consisting of an electric-powered hydraulic pump, fluid reservoir, dual lift cylinders, remote cab lift controls and all necessary hoses and valves. The hydraulic pump shall have a backup manual override, for use in the event of an electrical failure.

The cab lift controls shall be located at the driver side front of the cab, easily accessible under the full width front access hood. The controls shall include a permanently mounted raise/lower switch. A "cab unlocked" indicator light shall be located at the controls that shall indicate when the cab is not in the locked position for safe road travel. For enhanced visibility during cab tilt operations, a remote control tether with on/off switch shall be supplied on a coiled cord that shall extend from 2' (coiled) to 6' (extended).

The cab shall be capable of tilting 42 degrees and 80 degrees with crane assist to accommodate engine maintenance and removal. The cab pivots shall be located 46.00" apart to provide stability while tilting the cab.
The rear of the cab shall be locked down by a two (2)-point, automatic, hydraulic, double hook mechanism that fully engages after the cab has been lowered (self-locking). The dual 2.25" diameter hydraulic cylinders shall be equipped with a velocity fuse that protects the cab from accidentally descending when the cab is in the tilt position.

For increased safety, a redundant mechanical stay arm shall be provided that must be manually put in place on the driver side between the chassis and cab frame when cab is in the raised position. This device shall be manually stowed to its original position before the cab can be lowered.

**Cab Lift Interlock**

The cab lift safety system shall be interlocked to the parking brake. The cab tilt mechanism shall be active only when the parking brake is set and the ignition switch is in the on position. If the parking brake is released, the cab tilt mechanism shall be disabled.

**GRILLE**

A bright finished aluminum mesh grille screen, inserted behind a formed bright finished grille surround, shall be provided on the front center of the cab, and shall serve as an air intake to the radiator.

**DOOR JAMB SCUFFPLATES**

All cab door jambs shall be furnished with a polished stainless steel scuffplate, mounted on the striker side of the jamb.

**FRONT CAB TRIM**

Bright finished circular trim rings shall be installed around the four (4) headlights for an enhanced, streamlined automotive appearance.

A 10.00" band of 22 gauge patterned stainless steel trim shall be installed across the front of the cab, from door hinge to door hinge. The trim band shall be centered on the front warning lights and applied with two (2)-sided tape. A 0.625" self adhesive trim strip shall be applied around the perimeter of the trim band.

There shall be polished stainless steel corner covers provided over the painted cab corner where the cab turn signals are located.

**MIRRORS**

A Retrac, Model 613423, dual vision, motorized, west coast style mirror, with chrome finish, shall be mounted on each side of the front cab door with spring loaded retractable arms. The flat glass and convex glass shall be heated and adjustable with remote control within reach of the driver.
**CAB DOORS**

The forward cab and crew cab doors shall be the half-height style door. To enhance entry and egress to the cab, the forward cab doors shall be a minimum of 43.59" wide x 64.71" high. The crew cab doors shall measure a minimum of 37.87" wide x 64.71" high.

The forward cab and crew cab doors shall be constructed of extruded aluminum with a nominal material thickness of 0.125". The exterior door skins shall be constructed from 0.090" aluminum.

The forward cab door windows shall include a 7.50" high x 10.00" wide drop area at the front to enhance visibility.

A customized, vertical, pull-down type door handle shall be provided on the exterior of each cab door. The exterior handle shall be designed specifically for the fire service to prevent accidental activation, and shall provide 4.00" wide x 2.00" deep hand clearance for ease of use with heavy gloved hands. Each door shall also be provided with an interior flush, open style paddle handle that shall be readily operable from fore and aft positions, and be designed to prevent accidental activation. The interior handles shall provide 4.00" wide x 1.25" deep hand clearance for ease of use with heavy gloved hands.

The cab doors shall be provided with both interior (rotary knob) and exterior (keyed) locks exceeding FMVSS standards. The locks shall be capable of activating when the doors are open or closed. The doors shall remain locked if locks are activated when the doors are opened, then closed.

A full length, heavy duty, stainless steel, piano-type hinge with a 0.38" pin and 11 gauge leaf shall be provided on all cab doors. There shall be double automotive-type rubber seals around the perimeter of the door framing and door edges to ensure a weather-tight fit.

A chrome grab handle shall be provided on the inside of each cab and crew cab door.

The cab steps at each cab door location shall be located below the cab doors and shall be exposed to the exterior of the cab.

**CAB DOOR PANELS**

The inner cab door panels shall be constructed out of brushed stainless steel. The cab door panels shall be removable without disconnecting door and window mechanisms.

**RECESSED POCKET WITH ELASTIC COVER**

To provide organized storage (clutter control) in the cab for miscellaneous equipment, the cab interior shall be provided with recessed storage pockets. The pockets shall be 5.63" wide x 2.00"
**ELECTRIC WINDOW CONTROLS**
Each cab entry door shall be equipped with an electrically operated tempered glass window. A window control panel shall be located on the door panel within easy reach of the respective occupant. Each switch shall allow intermittent or auto down operation for ease of use. Auto down operation shall be actuated by holding the window down switch for approximately 1/2 second. The driver control panel shall contain a control switch for each cab door's window. All other door control panels shall contain a single switch to operate the window within that door.

The window switches shall be connected directly to the battery power. This allows the windows to be raised and lowered when the battery switch is in the off position.

**CAB STEPS**
The forward cab and crew cab access steps shall be a full size two (2) step design to provide largest possible stepping surfaces for safe ingress and egress. The bottom steps shall be designed with a grip pattern punched into bright aluminum treadplate material to provide support, slip resistance, and drainage. The bottom steps shall be a bolt-in design to minimize repair costs should they need to be replaced. The forward cab steps shall be a minimum 31.00" wide, and the crew cab steps shall be 24.25" wide with an 8.00" minimum depth. The inside cab steps shall not exceed 18.00" in height and be limited to two (2) steps. Three (3) step entrance designs shall not be acceptable due to safety concerns. A slip-resistant handrail shall be provided adjacent to each cab door opening to assist during cab ingress and egress.

**STEP LIGHTS**
There shall be eight (8) white LED, step lights provided. The lights shall be installed at each cab and crew cab door, two (2) per step, in the driver side front doorstep, driver side crew cab doorstep, passenger side front doorstep and passenger side crew cab doorstep.

To ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15" x 15" square placed ten (10) inches below the light and a minimum of 1.5 fc covering an entire 30" x 30" square at the same ten (10) inch distance below the light.

The lights shall be activated when the adjacent door is opened.

**FENDER CROWNS**
Stainless steel fender crowns shall be installed at the cab wheel openings.
GRAB HANDLES/STRAP (INTERIOR CREW CAB)
There shall be two (2) straps attached to the crew cab roof. Each strap shall be located driver and passenger side. These straps shall be furnished with a loop that is large enough to fit a gloved hand through. Location to be determined during pre-build meeting.

CAB INTERIOR
With safety as the primary objective, the wrap-around style cab instrument panel shall be designed with unobstructed visibility to instrumentation. The dash layout shall provide the driver with a quick reference to gauges that allows more time to focus on the road.

The center console shall be a high impact ABS polymer and shall be easily removable for access to the defroster. The center console shall include louvers strategically located for optimal air flow and defrost capability to the windshield.

The passenger side dashboard shall be constructed of painted aluminum for durability and low maintenance. For enhanced versatility, the passenger side dash shall include a flat working surface.

To provide optional (service friendly) control panels, switches and storage modules, a painted aluminum overhead console shall also be provided.

To complete the cab front interior design, painted aluminum modesty panels shall be provided under the dash on both sides of the cab. The driver side modesty panel shall provide mounting for the battery switch and diagnostic connectors, while the passenger side modesty panel provides a glove box, and ground access to the main electrical distribution panel via quick quarter turn fasteners.

To provide a deluxe automotive interior, the engine tunnel, side walls and rear wall shall be covered by Turnout Tuff fabric.

The headliner shall be installed in both forward and rear cab sections. The headliner panel shall be a composition of an aluminum panel covered with a sound barrier and upholstery.

The cab structure shall include designated raceways for electrical harness routing from the front of the cab to the rear upper portion of the cab. Raceways shall be extruded in the forward door frame, floor, walls and overhead in the area where the walls meet the ceiling. The raceways located in the floor shall be covered by aluminum extrusion, while the vertical and overhead raceways shall be covered by painted aluminum covers. The raceways shall improve harness integrity by providing a continuous harness path that eliminates wire chafing and abrasion associated with exposed wiring or routing through drilled metal holes. Harnesses shall be laid in
Routing through holes in tubing shall not be accepted due to chaffing that installation causes.

**CAB INTERIOR UPHOLSTERY**
The cab interior upholstery shall be gray. All cab interior materials shall meet FMVSS 302 (flammability of interior materials).

**CAB INTERIOR PAINT**
The cab interior metal surfaces shall be painted fire smoke gray, vinyl texture paint.

**CAB FLOOR**
The cab and crew cab floor areas shall be covered with Polydamp™ acoustical floor mat consisting of a black pyramid rubber facing and closed cell foam decoupler.

The top surface of the material has a series of raised pyramid shapes evenly spaced, which offer a superior grip surface. Additionally, the material has a 0.25" thick closed cell foam (no water absorption) which offers a sound dampening material for reducing sound levels.

**CAB DEFROSTER**
To provide maximum defrost and heating performance, a minimum 54,000 BTU heater-defroster unit with minimum 555 SCFM of air flow shall be provided inside the cab. The defroster unit shall be strategically located under the center forward portion of the instrument panel. For easy access, a removable metal cover shall be installed over the defroster unit. The defroster shall include an integral aluminum frame air filter, high performance dual scroll blowers, and ducts designed to provide maximum defrosting capabilities for the 1-piece windshield. The defroster ventilation shall be built into the design of the cab dash instrument panel and shall be easily removable for maintenance. The defroster shall be capable of clearing 98 percent of the windshield and side glass when tested under conditions where the cab has been cold soaked at 0 degrees Fahrenheit for 10 hours, and a 2 ounce per square inch layer of frost/ice has been able to build up on the exterior windshield. The defroster system shall meet or exceed SAE J382 requirements.

**CAB/CREW CAB HEATER**
Two (2) 36,700 BTU auxiliary heaters with minimum 275 SCFM (each unit) of air flow shall be provided inside the crew cab, one (1) in each outboard rear facing seat riser. The heaters shall include high performance dual scroll blowers, one (1) for each unit. Outlets for the heaters shall be located below each rear facing seat riser and below the fronts of the driver and passenger seats, for efficient airflow. An extruded aluminum plenum shall be incorporated in the cab structure that shall transfer heat to the forward cab seating positions.
The heater/defroster and crew cab heaters shall be controlled by an integral electronic control panel. The heater control panel shall allow the driver to control heat flow to the front and rear independently. The control panel shall include variable adjustment for temperature and fan control, and be conveniently located on the dash in clear view of the driver. The control panel shall include highly visible, progressive LED indicators for both fan speed and temperature.

**AIR CONDITIONING**

Due to the large space inside the cab, a high-performance, customized air conditioning system shall be furnished. A 19.10 cubic inch compressor shall be installed on the engine.

The air conditioning system shall be capable of cooling the average cab temperature from 100 degrees Fahrenheit to 64 degrees Fahrenheit in the forward section of the cab, and 69 degrees Fahrenheit in the rear section of the cab, at 50 percent relative humidity within 30 minutes. The cooling performance test shall be run only after the cab has been heat soaked at 100 degrees Fahrenheit for a minimum of 4 hours.

A roof-mounted condenser with a 63,000 BTU output that meets and exceeds the performance specification shall be installed on the cab roof. Mounting the condenser below the cab or body would reduce the performance of the system and shall not be acceptable.

The evaporator unit shall be installed in the rear portion of the cab ceiling over the engine tunnel. The evaporator shall include two (2) high performance cores and plenums with multiple outlets, one (1) plenum directed to the front and one (1) plenum directed to the rear of the cab.

The evaporator unit shall have a 49,000 BTU (4.08 tons) rating that meets and exceeds the performance specifications.

Adjustable air outlets shall be strategically located on the evaporator cover per the following:

- Four (4) shall be directed towards the drivers location
- Four (4) shall be directed towards the officers location
- Nine (9) shall be directed towards crew cab area

The air conditioner refrigerant shall be R-134A and shall be installed by a certified technician.

The air conditioner shall be controlled by dual zone integral electronic control panels for the heater, defroster and air conditioner. The cab control panel shall be located in the center console. For ease of operation, the control panels shall include variable adjustment for temperature and fan control.
INTERIOR CAB INSULATION
The cab walls, ceiling and engine tunnel shall be insulated in all strategic locations to maximize acoustic absorption and thermal insulation. The cab shall be insulated with 2.00" insulation in the rear wall, 3.00" insulation in the side walls, and 1.50" insulation in the ceiling. Headliners shall be constructed from a 0.20" high density polyethylene corrugated material. Each headliner shall be wrapped with a 0.25" thick foil faced poly damp low emissivity foam insulation barrier for acoustic and thermal control.

Designed for maximum sound absorption and thermal insulation, the rear cab wall shall be insulated with a 1.50" thick open cell acoustical foam. The thermal protection of the foam shall provide and R-value of four (4) per 1.00" thickness.

COVER, AIR CONDITIONING LINES AND CONNECTIONS
A formed cover shall be provided over the air conditioning lines and connections below the condenser. The cover shall be constructed of smooth aluminum. The cover shall be painted the same color as the air conditioning cover.

SUN VISORS
Two (2) smoked Lexan™ sun visors provided. The sun visors shall be located above the windshield with one (1) mounted on each side of the cab.

There shall be a black plastic thumb latch provided to help secure each sun visor in the stowed position.

GRAB HANDLE
A black rubber covered grab handle shall be mounted on the door post of the driver side cab door to assist in entering the cab. The grab handle shall be securely mounted to the post area between the door and windshield.

A long rubber grab handle shall be mounted on the dash board in front of the officer.

ENGINE COMPARTMENT LIGHTS
There shall be one (1) Whelen, Model 3SC0CDCR, 12 volt DC, 3.00" white LED light with Whelen, Model 3FLANGEC, chrome flange kit installed under the cab to be used as engine compartment illumination.

This light shall be activated automatically when the cab is raised.

ACCESS TO ENGINE DIPSTICKS
For access to the engine oil and transmission fluid dipsticks, there shall be a door on the engine tunnel, inside the crew cab. The door shall be on the rear wall of the engine tunnel, on the
vertical surface. The door shall be at least 17.75" wide x 12.75" high and be flush with the wall of the engine tunnel.

The engine oil dipstick shall allow for checking only. The transmission dipstick shall allow for both checking and filling. An additional port shall be provided for filling the engine oil.

The door shall have a rubber seal for thermal and acoustic insulation. One (1) flush latch shall be provided on the access door.

**CAB SAFETY SYSTEM**
The cab shall be provided with a safety system designed to protect occupants in the event of a side roll or frontal impact, and shall include the following:

- A supplemental restraint system (SRS) sensor shall be installed on a structural cab member behind the instrument panel. The SRS sensor shall perform real time diagnostics of all critical subsystems and shall record sensory inputs immediately before and during a side roll or frontal impact event.
- A slave SRS sensor shall be installed in the cab to provide capacity for eight (8) crew cab seating positions.
- A fault-indicating light shall be provided on the vehicle's instrument panel allowing the driver to monitor the operational status of the SRS system.
- A driver side front air bag shall be mounted in the steering wheel and shall be designed to protect the head and upper torso of the occupant, when used in combination with the 3-point seat belt.
- A passenger side knee bolster air bag shall be mounted in the modesty panel below the dash panel and shall be designed to protect the legs of the occupant, when used in combination with the 3-point seat belt.
- Air curtains shall be provided in the outboard bolster of outboard seat backs to provide a cushion between occupant and the cab wall.
- Suspension seats shall be provided with devices to retract them to the lowest travel position during a side roll or frontal impact event.
- Seat belts shall be provided with pre-tensioners to remove slack from the seat belt during a side roll or frontal impact event.

**FRONTAL IMPACT PROTECTION**
The SRS system shall provide protection during a frontal or oblique impact event. The system shall activate when the vehicle decelerates at a predetermined G force known to cause injury to the occupants. The cab and chassis shall have been subjected, via third party test facility, to a crash impact during frontal and oblique impact testing. Testing included all major chassis and
cab components such as mounting straps for fuel and air tanks, suspension mounts, front suspension components, rear suspensions components, frame rail cross members, engine and transmission and their mounts, pump house and mounts, frame extensions and body mounts. The testing provided configuration specific information used to optimize the timing for firing the safety restraint system. The sensor shall activate the pyrotechnic devices when the correct crash algorithm, wave form, is detected (no exception).

The SRS system shall deploy the following components in the event of a frontal or oblique impact event:

- Driver side front air bag
- Passenger side knee bolster air bag
- Air curtains mounted in the outboard bolster of outboard seat backs
- Suspension seats shall be retracted to the lowest travel position
- Seat belts shall be pre-tensioned to firmly hold the occupant in place

**SIDE ROLL PROTECTION**

The SRS system shall provide protection during a fast or slow 90 degree roll to the side, in which the vehicle comes to rest on its side. The system shall analyze the vehicle's angle and rate of roll to determine the optimal activation of the advanced occupant restraints.

The SRS system shall deploy the following components in the event of a side roll:

- Air curtains mounted in the outboard bolster of outboard seat backs
- Suspension seats shall be retracted to the lowest travel position
- Seat belts shall be pre-tensioned to firmly hold the occupant in place

**SEATING CAPACITY**

The seating capacity in the cab shall be four (4).

**DRIVER SEAT**

A seat shall be provided in the cab for the driver. The seat design shall be a cam action type with air suspension. For increased convenience, the seat shall include electric controls to adjust the rake (15 degrees), height (1.12" travel) and horizontal (7.75" travel) position. Electric controls shall be located below the forward part of the seat cushion. To provide flexibility for multiple driver configurations, the seat shall have a reclining back, adjustable from 20 degrees back to 45 degrees forward. Providing for maximum comfort, the seat back shall be a high back style with manual lumbar adjustment lever, for lower back support, and shall include minimum 7.50" deep side bolster pads for maximum support. The lumbar adjustment lever shall be easily located at
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<table>
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<th>Spec Details</th>
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<td><strong>The seat shall be furnished with a 3-point, shoulder type seat belt.</strong> To provide quick, easy use for occupants wearing bunker gear, the seat belt shall have a minimum 120.00&quot; shoulder length and 55.00&quot; lap length. The seat belt tongue shall be stored at waist position for quick application by the seat occupant. The seat belt receptacle shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.</td>
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**OFFICER SEAT**

A seat shall be provided in the cab for the passenger. The seat shall be a cam action type with air suspension. For increased convenience, the seat shall include a manual control to adjust the horizontal position (6.00" travel). The manual horizontal control shall be a towel-bar style located below the forward part of the seat cushion. For optimal comfort, the seat shall be provided with 17.00" deep dual density foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seat shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not belted.

The seat back shall be an SCBA back style with 7.5 degree fixed recline angle, and shall include minimum 4.50" wide x 7.50" deep side bolster pads for maximum support. The SCBA cavity shall be adjustable from front to rear in 1.00" increments, to accommodate different sized SCBA cylinders. Moving the SCBA cavity shall be accomplished by unbolting, relocating, and rebolting it in the desired location.

The seat shall include the following features incorporated into the side roll protection system:

- **Side air curtain shall be mounted integral to the outboard bolster of the seat back.** The air curtain shall be covered by a decorative panel when in the stowed position.
- **A suspension seat safety system shall be included.** When activated in the event of a side roll, this system shall pretension the seat belt and retract the seat to its lowest travel position.

The seat shall include the following features incorporated into the side roll protection system:

- **Side air curtain shall be mounted integral to the outboard bolster of the seat back.** The air curtain shall be covered by a decorative panel when in the stowed position.
- **A suspension seat safety system shall be included.** When activated in the event of a side roll, this system shall pretension the seat belt and retract the seat to its lowest travel position.
The seat shall be furnished with a 3-point, shoulder type seat belt. To provide quick, easy use for occupants wearing bunker gear, the seat belt shall have a minimum 120.00" shoulder length and 55.00" lap length. The seat belt tongue shall be stored at waist position for quick application by the seat occupant. The seat belt receptacle shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belt shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.

**RADIO COMPARTMENT**
A compartment for the radio amplifier shall be located on the back wall of the EMS compartment behind the front passenger seat. A removable door with small chrome plated lift and turn latches shall be provided for access. The compartment shall be constructed of smooth aluminum and painted to match the cab interior. Louvers shall be provided to allow for ventilation. The radio control shall be located in the overhead console on the passenger side.

**REAR FACING EMS COMPARTMENT – DRIVER SIDE**
A rear facing EMS compartment shall be provided in the crew cab at the driver side outboard position.

The compartment shall be 20.00" wide x 42.00" high x 26.00" deep with one (1) Amdor roll up door, non-locking with anodized finish.

The compartment shall be constructed of smooth aluminum and painted to match the cab interior.

There shall be two (2) shelves provided. Each shelf shall be constructed of 0.090" aluminum with a 1.25" up-turned lip. Shelving shall be infinitely adjustable by means of a threaded tighter sliding in a track.

The location shall be two (2) shelves in the driver side rear facing EMS cabinet.

**Compartment Light**
There shall be one (1) white Amdor LED strip light installed on the left side of the compartment opening. The lights shall be controlled by an automatic door switch.

**EMS COMPARTMENT – PASSENGER SIDE**
A rear facing EMS compartment shall be provided in the crew cab at the passenger side outboard position.

The compartment shall be approximately 20.00" wide x 30.00" high x 26.00" deep. The interior door shall be web netting. The netting is to be made with 1.00" wide nylon material with 2.00"
openings. Side release buckles shall be used to fasten all sides of the opening. The clear door opening of the compartment shall be approximately 17.50" wide x 27.50" high.

The compartment shall be constructed of smooth aluminum and painted to match the cab interior.

**COMPARTMENT LIGHT**

There shall be two (2) white Amdor, LED strip lights installed, one (1) each side of the compartment opening. The lights shall be controlled by a switch on the exterior of the compartment.

**FORWARD FACING CENTER SEATS**

There shall be two (2) forward facing seats provided at the center position in the crew cab. The seats shall be spaced 8.00" apart to provide additional room for each occupant. For optimal comfort, the seats shall be provided with 17.00" deep dual density foam cushions designed with EVC (elastomeric vibration control). To ensure safe operation, the seats shall be equipped with seat belt sensors in the seat cushion and belt receptacle that shall activate an alarm indicating a seat is occupied but not buckled.

The seat backs shall be an SCBA back style with 7.50 degree fixed recline angle, and shall include minimum 4.50" wide x 7.50" deep side bolster pads for maximum support. The SCBA cavity shall be adjustable from front to rear in 1.00" increments, to accommodate different sized SCBA cylinders. Moving the SCBA cavity shall be accomplished by unbolting, relocating, and re-bolting it in the desired location.

The seats shall include the following feature incorporated into the side roll protection system.

A seat safety system shall be included. When activated, this system shall pretension the seat belts around the occupants to firmly hold them in place in the event of a side roll.

The seats shall be furnished with three (3)-point, shoulder type seat belts. To provide quick, easy use for occupants wearing bunker gear, the seat belts shall have a minimum 130.00" shoulder length and 55.00" lap length. The seat belt tongue shall be stored at waist position for quick application by the seat occupant. The seat belt receptacle shall be provided on a cable conveniently nested next to the seat cushion, providing easy accessibility. The seat belts shall be furnished with dual automatic retractors that shall provide ease of operation in the normal seating position.

**SEAT UPHOLSTERY**

All seat upholstery shall be gray Turnout Tuff material.
AIR BOTTLE HOLDERS
All SCBA type seats in the cab shall have a "Hands-Free" auto clamp style bracket in its backrest. For efficiency and convenience, the bracket shall include an automatic spring clamp that allows the occupant to store the SCBA bottle by simply pushing it into the seat back. For protection of all occupants in the cab, in the event of an accident, the inertial components within the clamp shall constrain the SCBA bottle in the seat and shall exceed the NFPA standard of 9G. Bracket designs with manual restraints (belts, straps, buckles) that could be inadvertently left unlocked and allow the SCBA to move freely within the cab during an accident, shall not be acceptable.

There shall be a quantity of three (3) SCBA brackets.

SEAT BELTS
All seating positions in the cab and crew cab shall have red seat belts.

The belts shall also include the Ready Reach® D-loop assembly to the shoulder belt system. The Ready Reach feature adds an extender arm to the D-loop location placing the D-loop in a closer, easier to reach location.

SHOULDER HARNESS HEIGHT ADJUSTMENT
All seating positions furnished with 3-point shoulder type seat belts shall include a height adjustment. This adjustment shall optimize the belts effectiveness and comfort for the seated firefighter.

A total of four (4) seating positions shall have the adjustable shoulder harness.

SEAT BELT MONITORING SYSTEM
A seat belt monitoring system (SBMS) shall be provided. The SBMS shall be capable of monitoring up to ten (10) seat positions indicating the status of each seat position with a green or red LED indicator as follows:

- Seat Occupied & Buckled = Green
- Seat Occupied & Unbuckled = Red
- No Occupant & Buckled = Red
- No Occupant & Unbuckled = Not Illuminated

The SBMS shall include an audible alarm that shall be activated when a red illumination condition exists and the parking brake is released, or a red illumination condition exists and the transmission is not in park.
HELMET STORAGE, WILL BE PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, section 14.1.8.4.1 requires a location for helmet storage be provided.

CAB DOME LIGHTS
There shall be four (4) dual LED dome lights with black bezels provided. Two (2) lights shall be mounted above the inside shoulder of the driver and officer and two (2) lights shall be installed and located, one (1) on each side of the crew cab.

The color of the LED's shall be red and white.

The white LED's shall be controlled by the door switches and the lens switch.

The color LED's shall be controlled by the lens switch.

In order to ensure exceptional illumination, each white LED dome light shall provide a minimum of 10.1 foot-candles (fc) covering an entire 20.00" x 20.00" square seating position when mounted 40.00" above the seat.

OVERHEAD MAP LIGHTS
There shall be two (2) Peterson, Model M371S, rectangular LED adjustable map lights installed in the cab:

- One (1) overhead in front of the driving position.
- One (1) overhead in front of the passenger's position.

Each light shall include a switch on the light housing.

The light switches shall be connected directly to the battery switched power.

PORTABLE HAND LIGHTS, WILL BE PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, section 9.8.3 requires two portable hand lights mounted in brackets fastened to the apparatus.

CAB INSTRUMENTATION
The cab instrument panel shall consist of gauges, an LCD display, telltale indicator lights, alarms, control switches, and a diagnostic panel. The function of instrument panel controls and switches shall be identified by a label adjacent to each item. Actuation of the headlight switch shall illuminate the labels in low light conditions. Telltale indicator lamps shall not be illuminated unless necessary. The cab instruments and controls shall be conveniently located within the forward cab section directly forward of the driver. Gauge and switch panels shall be designed to be removable for ease of service and low cost of ownership.
Gauges

The gauge panel shall include the following ten (10) ivory gauges with chrome bezels to monitor vehicle performance:

- Voltmeter gauge (Volts)
  Low volts (11.8 VDC)
  Amber indicator on gauge assembly with alarm

High volts (15 VDC)
  Amber indicator on gauge assembly with alarm

Very low volts (11.3 VDC)
  Amber indicator on gauge assembly with alarm

Very high volts (16 VDC)
  Amber indicator on gauge assembly with alarm

- Tachometer (RPM)

- Speedometer (Primary (outside) MPH, Secondary (inside) Km/H)

- Fuel level gauge (Empty - Full in fractions)
  Low fuel (1/8 full)
  Amber indicator on gauge assembly with alarm

Very low fuel (1/32) fuel
  Amber indicator on gauge assembly with alarm

- Engine oil pressure gauge (PSI)
  Low oil pressure to activate engine warning lights and alarms
  Red indicator on gauge assembly with alarm

- Front air pressure gauge (PSI)
  Low air pressure to activate warning lights and alarm
  Red indicator on gauge assembly with alarm

- Rear air pressure gauge (PSI)
  Low air pressure to activate warning lights and alarm
  Red indicator on gauge assembly with alarm

- Transmission oil temperature gauge (Fahrenheit)
  High transmission oil temperature activates warning lights and alarm
Amber indicator on gauge assembly with alarm

- Engine coolant temperature gauge (Fahrenheit)
  High engine temperature activates an engine warning light and alarm
  Red indicator on gauge assembly with alarm

- Diesel Exhaust Fluid Level Gauge (Empty - Full in fractions)
  Low fluid (1/8 full)
  Amber indicator on gauge assembly with alarm

All gauges and gauge indicators shall perform prove out at initial power-up to ensure proper performance.

**INDICATOR LAMPS**

To promote safety, the following telltale indicator lamps shall be integral to the gauge assembly and are located above and below the center gauges. The indicator lamps shall be "dead-front" design that is only visible when active. The colored indicator lights shall have descriptive text or symbols.

The following amber telltale lamps shall be present:

- Low coolant
- Trac cntl (traction control) (where applicable)
- Check engine
- Check trans (check transmission)
- Aux brake overheat (Auxiliary brake overheat)
- Air rest (air restriction)
- Caution (triangle symbol)
- Water in fuel
- DPF (engine diesel particulate filter regeneration)
- Trailer ABS (where applicable)
- Wait to start (where applicable)
- HET (engine high exhaust temperature) (where applicable)
- ABS (antilock brake system)
- MIL (engine emissions system malfunction indicator lamp) (where applicable)
- SRS (supplemental restraint system) fault (where applicable)
- DEF (low diesel exhaust fluid level)

The following red telltale lamps shall be present:

- Warning (stop sign symbol)
The following green telltale lamps shall be provided:

- Left turn
- Right turn
- Battery on

The following blue telltale lamp shall be provided:

- High beam

**ALARMS**

Audible steady tone warning alarm: A steady audible tone alarm shall be provided whenever a warning message is present.

Audible pulsing tone caution alarm: A pulsing audible tone alarm (chime/chirp) shall be provided whenever a caution message is present without a warning message being present.

Alarm silence: Any active audible alarm shall be able to be silenced by holding the ignition switch at the top position for three (3) to five (5) seconds. For improved safety, silenced audible alarms shall intermittently chirp every 30 seconds until the alarm condition no longer exists. The intermittent chirp shall act as a reminder to the operator that a caution or warning condition still exists. Any new warning or caution condition shall enable the steady or pulsing tones respectively.

**INDICATOR LAMP AND ALARM PROVE-OUT**

Telltale indicators and alarms shall perform prove-out at initial power-up to ensure proper performance.

**CONTROL SWITCHES**

For ease of use, the following controls shall be provided immediately adjacent to the cab instrument panel within easy reach of the driver.

Emergency master switch: A molded plastic push button switch with integral indicator lamp shall be provided. Pressing the switch shall activate emergency response lights and siren control. A green lamp on the switch provides indication that the emergency master mode is active. Pressing the switch again disables the emergency master mode.
Headlight / Parking light switch: A three (3)-position maintained rocker switch shall be provided. The first switch position shall deactivate all parking lights and the headlights. The second switch position shall activate the parking lights. The third switch position shall activate the headlights.

Panel backlighting intensity control switch: A three (3)-position momentary rocker switch shall be provided. The first switch position decreases the panel backlighting intensity to a minimum level as the switch is held. The second switch position is the default position that does not affect the backlighting intensity. The third switch position increases the panel backlighting intensity to a maximum level as the switch is held.

The following standard controls shall be integral to the gauge assembly and are located below the right hand gauges. All switches have backlit labels for low light applications.

High idle engagement switch: A two (2)-position momentary rocker switch with integral indicator lamp shall be provided. The first switch position is the default switch position. The second switch position shall activate and deactivate the high idle function when pressed and released. The "Ok To Engage High Idle" indicator lamp must be active for the high idle function to engage. A green indicator lamp integral to the high idle engagement switch shall indicate when the high idle function is engaged.

"Ok To Engage High Idle" indicator lamp: A green indicator light shall be provided next to the high idle activation switch to indicate that the interlocks have been met to allow high idle engagement.

The following standard controls shall be provided adjacent to the cab gauge assembly within easy reach of the driver. All switches shall have backlit labels for low light applications.

Ignition switch: A three (3)-position maintained/momentary rocker switch shall be provided. The first switch position shall deactivate vehicle ignition. The second switch position shall activate vehicle ignition. The third momentary position shall disable the information screen audible alarm if held for three (3) to five (5) seconds. A green indicator lamp shall be activated with vehicle ignition.

Engine start switch: A two (2)-position momentary rocker switch shall be provided. The first switch position is the default switch position. The second switch position shall activate the vehicle's engine. The switch actuator is designed to prevent accidental activation.

4-way hazard switch: A two (2)-position maintained rocker switch shall be provided. The first switch position shall deactivate the 4-way hazard switch function. The second switch position shall activate the 4-way hazard function. The switch actuator shall be red and includes the international 4-way hazard symbol.
Heater, defroster, and optional air conditioning control panel: A control panel with membrane switches shall be provided to control heater/defroster temperature and heater, defroster, and air conditioning fan speeds. A green LED status bar shall indicate the relative temperature and fan speed settings.

Turn signal arm: A self-canceling turn signal with high beam headlight and windshield wiper/washer controls shall be provided. The windshield wiper control shall have high, low, and intermittent modes.

Parking brake control: An air actuated push/pull park brake control valve shall be provided.

Chassis horn control: Activation of the chassis horn control shall be provided through the center of the steering wheel.

CUSTOM SWITCH PANELS
The design of cab instrumentation shall allow for emergency lighting and other switches to be placed within easy reach of the operator thus improving safety. There shall be positions for up to four (4) switch panels in the overhead console on the driver's side, up to four (4) switch panels in the engine tunnel console facing the driver, up to four (4) switch panels in the overhead console on the officer's side and up to two (2) switch panels in the engine tunnel console facing the officer. All switches shall have backlit labels for low light applications.

DIAGNOSTIC PANEL
A diagnostic panel shall be accessible while standing on the ground and located inside the driver's side door left of the steering column. The diagnostic panel shall allow diagnostic tools such as computers to connect to various vehicle systems for improved troubleshooting providing a lower cost of ownership. Diagnostic switches shall allow engine and ABS systems to provide blink codes should a problem exist.

The diagnostic panel shall include the following:
- Engine diagnostic port
- Transmission diagnostic port
- ABS diagnostic port
- SRS diagnostic port (where applicable)
- Information screen USB diagnostic port
- Engine diagnostic switch (blink codes flashed on check engine telltale indicator)
- ABS diagnostic switch (blink codes flashed on ABS telltale indicator)
- Diesel particulate filter regeneration switch (where applicable)
- Diesel particulate filter regeneration inhibit switch (where applicable)
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**CAB LCD DISPLAY**
A digital four (4)-row by 20-character dot matrix display shall be integral to the gauge panel. The display shall be capable of showing simple graphical images as well as text. The display shall be split into three (3) sections. Each section shall have a dedicated function. The upper left section shall display the outside ambient temperature.

The upper right section shall display, along with other configuration specific information:

- Odometer
- Trip mileage
- PTO hours
- Fuel consumption
- Engine hours

The bottom section shall display INFO, CAUTION, and WARNING messages. Text messages shall automatically activate to describe the cause of an audible caution or warning alarm. The LCD shall be capable of displaying multiple text messages should more than one caution or warning condition exist.

**AIR RESTRICTION INDICATOR**
A high air restriction warning indicator light LCD message with amber warning indicator and audible alarm shall be provided.

"**DO NOT MOVE APPARATUS**" INDICATOR
There shall be a Whelen, Model 5SR00FRR, flashing red LED indicator light located in the driving compartment. The light shall be illuminated automatically per the current NFPA requirements and labeled "Do Not Move Apparatus If Light Is On".

The same circuit that activates the Do Not Move Apparatus indicator shall activate a steady tone alarm when the parking brake is released.

**DO NOT MOVE TRUCK MESSAGES**
Messages shall be displayed on the Information screen color display located within sight of the driver whenever the Do Not Move Truck light is active. The messages shall designate the item or items not in the stowed for vehicle travel position (parking brake disengaged).

The following messages shall be displayed (where applicable):

- Do Not Move Truck
- DS Cab Door Open (Driver Side Cab Door Open)
- PS Cab Door Open (Passenger's Side Cab Door Open)
• DS Crew Cab Door Open (Driver Side Crew Cab Door Open)
• PS Crew Cab Door Open (Passenger's Side Crew Cab Door Open)
• DS Body Door Open (Driver Side Body Door Open)
• PS Body Door Open (Passenger's Side Body Door Open)
• Rear Body Door Open
• DS Ladder Rack Down (Driver Side Ladder Rack Down)
• PS Ladder Rack Down (Passenger Side Ladder Rack Down)
• Deck Gun Not Stowed
• Lt Tower Not Stowed (Light Tower Not Stowed)
• Hatch Door Open
• Fold Tank Not Stowed (Fold-A-Tank Not Stowed)
• Aerial Not Stowed (Aerial Device Not Stowed)
• Stabilizer Not Stowed
• Steps Not Stowed
• Handrail Not Stowed

Any other device that is opened, extended, or deployed that creates a hazard or is likely to cause major damage to the apparatus if the apparatus is moved shall be displayed as a caution message after the parking brake is disengaged.

**SWITCH PANELS**

The emergency light switch panel shall have a master switch for ease of use plus individual switches for selective control. Each switch panel shall contain eight (8) membrane-type switches each rated for one million (1,000,000) cycles. Panels containing less than eight (8) switch assignments shall include non-functioning black appliqués. Documentation shall be provided by the manufacturer indicating the rated cycle life of the switches. The switch panel(s) shall be located in the overhead position above the windshield on the driver side overhead to allow for easy access.

Additional switch panel(s) shall be located in the overhead position(s) above the windshield or in designated locations on the lower instrument panel layout.

The switches shall be membrane-type and also act as an integral indicator light. For quick, visual indication the entire surface of the switch shall be illuminated white whenever back lighting is activated and illuminated green whenever the switch is active. An active illuminated switch shall flash when interlock requirements are not met or device is actively being load managed. For ease of use, a two (2)-ply, scratch resistant laser engraved Gravoply label
indicating the use of each switch shall be placed in the center of the switch. The label shall allow light to pass through the letters for ease of use in low light conditions.

**WIPER CONTROL**
For simple operation and easy reach, the windshield wiper control shall be an integral part of the directional light lever located on the steering column. The wiper control shall include high and low wiper speed settings, a one (1)-speed intermittent wiper control and windshield washer switch. The control shall have a "return to park" provision, which allows the wipers to return to the stored position when the wipers are not in use.

**HOURMETER - AERIAL DEVICE**
An hourmeter for the aerial device shall be provided and located within the cab display or instrument panel.

**AERIAL MASTER**
There shall be a master switch for the aerial operating electrical system provided.

**AERIAL PTO SWITCH**
A PTO switch for the aerial with indicator light shall be provided.

**SPARE CIRCUITS – BEHIND SWITCH PANEL**
There shall be one (1) pair of wires, including a positive and a negative, installed on the apparatus.

The above wires shall have the following features:

- The positive wire shall be connected directly to the battery power.
- The negative wire shall be connected to ground.
- Wires shall be protected to 15 amps at 12 volts DC.
- Power and ground shall terminate behind switch panel above officer seat
- Termination shall be with heat shrinkable butt splicing.

Wires shall be sized to 125% of the protection.

This circuit(s) may be load managed when the parking brake is set.

**SPARE CIRCUIT – OFFICER SIDE DASH AREA**
There shall be two (2) pair of wires, including a positive and a negative, installed on the apparatus.

The above wires shall have the following features:
• The positive wire shall be connected directly to the battery power.
• The negative wire shall be connected to ground.
• Wires shall be protected to 15 amps at 12 volts DC.
• Power and ground shall terminate officer side dash area.
• Termination shall be with 15 amp, power point plug with rubber cover.

Wires shall be sized to 125 percent of the protection.

The circuit(s) may be load managed when the parking brake is set.

**SPARE CIRCUIT – PASSENGER SIDE EMS COMPARTMENT**

There shall be one (1) pair of wires, including a positive and a negative, installed on the apparatus.

• The above wires shall have the following features:
  • The positive wire shall be connected directly to the battery power.
  • The negative wire shall be connected to ground.
  • Wires shall be protected to 15 amps at 12 volts DC.
  • Power and ground shall terminate in passenger side EMS compartment with 2' loop for radioequipment.
  • Termination shall be with heat shrinkable butt splicing.

Wires shall be sized to 125% of the protection.

This circuit(s) may be load managed when the parking brake is set.

**SPARE CIRCUIT- DRIVER SIDE EMS COMPARTMENT**

There shall be one (1) pair of wires, including a positive and a negative, installed on the apparatus.

The above wires shall have the following features:

• The positive wire shall be connected directly to the battery power.
• The negative wire shall be connected to ground.
• Wires shall be protected to 15 amps at 12 volts DC.
• Power and ground shall terminate driver side EMS Compartment, low on back wall providing a box for Power point plug.
• Termination shall be with 15 amp, power point plug with rubber cover.

Wires shall be sized to 125 percent of the protection.
This circuit(s) may be load managed when the parking brake is set.

**SPARE CIRCUIT – DRIVER SIDE EMS COMPARTMENT**

There shall be three (3) pair of wires, including a positive and a negative, installed on the apparatus.

The above wires shall have the following features:

- The positive wire shall be connected directly to the battery power.
- The negative wire shall be connected to ground.
- Wires shall be protected to 15 amps at 12 volts DC.
- Power and ground shall terminate in rear facing driver side EMS compartment.
- Termination shall be with heat shrinkable butt splicing.

Wires shall be sized to 125% of the protection.

This circuit(s) may be load managed when the parking brake is set.

**WEATHER BAND RADIO WITH CD PLAYER**

There shall be a Panasonic™, AM/FM/Weather Band stereo radio with compact disc player and auxiliary input jack installed.

The compact disc stereo radio shall be mounted within reach of the driver.

The quantity and location of the speakers shall be one (1) pair of 5.25" speakers in the cab and one (1) pair of 5.25" speakers in the crew cab.

The type and location of the antenna shall be a roof-mounted rubber antenna located in an open space, on the cab roof.

**INFORMATION CENTER**

An information center employing a 7.00" diagonal touch screen color LCD display shall be encased in an ABS plastic housing.

The information center shall have the following specifications:

- Operate in temperatures from -40 to 185 degrees Fahrenheit
- An Optical Gel shall be placed between the LCD and protective lens
- Five weather resistant user interface switches
- Grey with black accents
- Sunlight Readable
- Linux operating system
2016:02 Heavy Duty Aerial Ladder Truck Specs.

- Minimum of 1000nits rated display
- Display can be changed to an available foreign language
- A LCD display integral to the cab gauge panel shall be included as outlined in the cab instrumentation area.
- Programmed to read US Customary

GENERAL SCREEN DESIGN
Where possible, background colors shall be used to provide "At a Glance" vehicle information. If information provided on a screen is within acceptable limits, a green background shall be used.

If a caution or warning situation arises the following shall occur:

- An amber background/text color shall indicate a caution condition
- A red background/text color shall indicate a warning condition
- The information center shall utilize an "Alert Center" to display text messages for audible alarm tones. The text messages shall be written to identify the item(s) causing the audible alarm to sound. If more than one (1) text message occurs, the messages shall cycle every second until the problem(s) have been resolved. The background color for the "Alert Center" shall change to indicate the severity of the "warning" message. If a warning and a caution condition occur simultaneously, the red background color shall be shown for all alert center messages.
- A label for each button shall exist. The label shall indicate the function for each active button for each screen. Buttons that are not utilized on specific screens shall have a button label with no text or symbol.

HOME/TRANSIT SCREEN
This screen shall display the following:

- Vehicle Mitigation (if equipped)
- Water Level (if equipped)
- Foam Level (if equipped)
- Seat Belt Monitoring Screen
- Tire Pressure Monitoring (if equipped)
- Digital Speedometer
- Active Alarms

ON SCENE SCREEN
This screen shall display the following and shall be auto activated with pump engaged (if equipped):
• Battery Voltage
• Fuel
• Oil Pressure
• Coolant Temperature
• RPM
• Water Level (if equipped)
• Foam Level (if equipped)
• Foam Concentration (if equipped)
• Water Flow Rate (if equipped)
• Water Used (if equipped)
• Active Alarms

VIRTUAL BUTTONS
There shall be four (4) virtual switch panel screens that match the overhead and lower lighting and HVAC switch panels.

PAGE SCREEN
The page screen shall display the following and allow the user to progress into other screens for further functionality:

• Diagnostics
  o Faults
    ▪ Listed by order of occurrence
    ▪ Allows to sort by system
  o Interlock
    ▪ Throttle Interlocks
    ▪ Pump Interlocks (if equipped)
    ▪ Aerial Interlocks (if equipped)
    ▪ PTO Interlocks (if equipped)
  o Load Manager
    ▪ A list of items to be load managed shall be provided. The list shall provide a description of the load.
    ▪ The lower the priority numbers the earlier the device shall be shed should a low voltage condition occur.
    ▪ The screen shall indicate if a load has been shed (disabled) or not shed.
    ▪ "At a glance" color features are utilized on this screen.
  o Systems
    ▪ Information screen
Module type and ID number
Module Version
Input or output number
Circuit number connected to that input or output
Status of the input or output
Power and Constant Current module diagnostic information
  - Foam (if equipped)
  - Pressure Controller (if equipped)
  - Generator Frequency (if equipped)
  - Live Data
    - General Truck Data

Maintenance
  - Engine oil and filter
  - Transmission oil and filter
  - Pump oil (if equipped)
  - Foam (if equipped)
  - Aerial (if equipped)

Setup
  - Clock Setup
    - Date & Time
      - 12 or 24 hour format
      - Set time and date
    - Backlight
      - Daytime
      - Night time
      - Sensitivity
  - Unit Selection
  - Home Screen
  - Virtual Button Setup
  - On Scene Screen Setup
  - Configure Video Mode
    - Set Video Contrast
    - Set Video Color
    - Set Video Tint

Do Not Move
The screen shall indicate the approximate location and type of item that is open or is not stowed for travel. The actual status of the following devices shall be indicated:

- Driver Side Cab Door
- Passenger's Side Cab Door
- Driver Side Crew Cab Door
- Passenger's Side Crew Cab Door
- Driver Side Body Doors
- Passenger's Side Body Doors
- Rear Body Door(s)
- Ladder Rack (if applicable)
- Deck Gun (if applicable)
- Light Tower (if applicable)
- Hatch Door (if applicable)
- Stabilizers (if applicable)
- Steps (if applicable)

- Notifications
  - View Active Alarms
    - Shows a list of all active alarms including date and time of the occurrence is shown with each alarm
    - Silence Alarms - All alarms are silenced

- Timer Screen
- HVAC (if equipped)
- Tire Information (if equipped)

Button functions and button labels may change with each screen.

**VEHICLE DATA RECORDER**

A vehicle data recorder (VDR) shall be provided. The VDR shall be capable of reading and storing vehicle information.

The information stored on the VDR can be downloaded through a USB port mounted in a convenient location determined by cab model. A CD provided with the apparatus shall include the programming to download the information from the VDR. A USB cable can be used to connect the VDR to a laptop to retrieve required information.

The vehicle data recorder shall be capable of recording the following data via hardwired and/or CAN inputs:
### INTERCOM SYSTEM

A five (5) position Sigtronics model US-45D dual radio interface intercom shall be provided. The positions shall be driver, officer, two (2) crew cab located at both forward facing seats, and pump panel. All positions shall have intercom capabilities. The driver, officer and pump panel locations shall have dual radio transmit capability.

System includes:

- One (1) US-45D Intercom.
- Four (4) Interior Headset Jacks, enclosed in blue mounting boxes.
- One (1) Exterior Headset Jack, enclosed in blue mounting box equipped with splash cover.
- Three (3) Push-to-Talk switches, enclosed in blue mounting boxes.
- One (1) CLPLUS-01 SIG KIT ControlLink Plus (includes base, headset, 4-conductor jack and adapter for wireless base, and chargers)
- All necessary cabling and mounting provisions shall be included with the installation.

### RADIO / INTERCOM INTERFACE CABLES

The apparatus manufacturer shall supply and install two (2) radio interface cables before delivery of the vehicle.

The radio equipment to be used by the customer shall be:

- Motorola Mid Power, Model XTL 2500
- ICOM, Model IC-F5061D
HEADSET, UNDER HELMET
There shall be three (3) Sigtronics, Model SE-8, under helmet, standard headset(s) provided Officer seat and 2 passenger.

Each headset shall feature:

- Coiled cord with single nickel coated plug
- Noise cancelling electret microphone with wind muff
- Flexible microphone boom rotates 180 degrees for left or right dress
- Gel filled earseals
- Volume control
- 24 dB noise reduction

HEADSET, UNDER HELMET
There shall be one (1) Sigtronics, Model SE-8S, under helmet, standard headset(s) with one (1) slotted ear cup provided driver.

Each headset shall feature:

- Coiled cord with single nickel coated plug
- Noise cancelling electric microphone with wind muff
- Flexible microphone boom rotates 180 degrees for left or right dress
- Gel filled earseal
- Volume control
- 24 dB noise reduction

HEADSET HANGERS
There shall be four (4) headset hanger(s) installed driver's seat, officer's seat and rear, center, forward facing seat. The hanger(s) shall meet NFPA 1901, Section 14.1.11, requirement for equipment mounting. Mounting location to be determined on final inspection

RADIO ANTENNA MOUNT
There shall be two (2) standard 1.125”, 18 thread antenna-mounting base(s), Model MATM, with 17 feet of coax cable and weatherproof cap provided for two (2)-way radio installation. One mount shall be located on the cab roof, above and to the rear of the officer seat and the second mount(s) shall be located above and to the rear of the driver’s seat. Coax from above the officer’s seat shall be routed to the radio compartment in EMS cabinet behind the officer's seat, the left side mount coax shall be routed to the area in overhead console above the officer's seat where the radios will be mounted. A weatherproof cap shall be installed on the mounts.
ELECTRICAL POWER CONTROL SYSTEM
The primary power distribution shall be located forward of the officer's seating position and be easily accessible while standing on the ground for simplified maintenance and troubleshooting. Additional electrical distribution centers shall be provided throughout the vehicle to house the vehicle's electrical power, circuit protection, and control components. The electrical distribution centers shall be located strategically throughout the vehicle to minimize wire length. For ease of maintenance, all electrical distribution centers shall be easily accessible. All distribution centers containing fuses, circuit breakers and/or relays shall be easily accessible.

Distribution centers located throughout the vehicle shall contain battery powered studs for supplying customer installed equipment thus providing a lower cost of ownership.

Circuit protection devices, which conform to SAE standards, shall be utilized to protect electrical circuits. All circuit protection devices shall be rated per NFPA requirements to prevent wire and component damage when subjected to extreme current overload. General protection circuit breakers shall be Type-I automatic reset (continuously resetting). When required, automotive type fuses shall be utilized to protect electronic equipment. Control relays and solenoid shall have a direct current rating of 125 percent of the maximum current for which the circuit is protected per NFPA.

SOLID-STATE CONTROL SYSTEM
A solid-state electronics based control system shall be utilized to achieve advanced operation and control of the vehicle components. A fully computerized vehicle network shall consist of electronic modules located near their point of use to reduce harness lengths and improve reliability. The control system shall comply with SAE J1939-11 recommended practices.

The control system shall operate as a master-slave system whereas the main control module instructs all other system components. The system shall contain patented Mission Critical software that maintains critical vehicle operations in the unlikely event of a main controller error. The system shall utilize a Real Time Operating System (RTOS) fully compliant with OSEK/VDX™ specifications providing a lower cost of ownership.

For increased reliability and simplified use the control system modules shall include the following attributes:

- Green LED indicator light for module power
- Red LED indicator light for network communication stability status
- Control system self test at activation and continually throughout vehicle operation
- No moving parts due to transistor logic
- Software logic control for NFPA mandated safety interlocks and indicators
Integrated electrical system load management without additional components
Integrated electrical load sequencing system without additional components
Customized control software to the vehicle's configuration
Factory and field re-programmable to accommodate changes to the vehicle's operating parameters
Complete operating and troubleshooting manuals
USB connection to the main control module for advanced troubleshooting

To assure long life and operation in a broad range of environmental conditions, the solid-state control system modules shall meet the following specifications:

- Module circuit board shall meet SAE J771 specifications
- Operating temperature from -40°C to +70°C
- Storage temperature from -40°C to +70°C
- Vibration to 50g

IP67 rated enclosure (Totally protected against dust and also protected against the effect of temporary immersion between 15 centimeters and one (1) meter)

Operating voltage from eight (8) volts to 16 volts DC

The main controller shall activate status indicators and audible alarms designed to provide warning of problems before they become critical.

**CIRCUIT PROTECTION AND CONTROL DIAGRAM**

Copies of all job-specific, computer network input and output (I/O) connections shall be provided with each chassis. The sheets shall indicate the function of each module connection point, circuit protection information (where applicable), wire numbers, wire colors and load management information.

**ON-BOARD ADVANCED/VISUAL ELECTRICAL SYSTEM DIAGNOSTICS**

The on-board information center shall include the following diagnostic information:

- Text description of active warning or caution alarms
- Simplified warning indicators
- Amber caution indication with intermittent alarm
- Red warning indication with steady tone alarm

All control system modules, with the exception of the main control module, shall contain on-board visual diagnostic LEDs that assist in troubleshooting. The LEDs shall be enclosed within...
the sealed, transparent module housing near the face of the module. One LED for each input or output shall be provided and shall illuminate whenever the respective input or output is active. Color-coded labels within the modules shall encompass the LEDs for ease of identification. The LED indicator lights shall provide point of use information for reduced troubleshooting time without the need for an additional computer.

**TECH MODULE WITH WIFI**
An in cab module will provide Wifi wireless interface and data logging capability. The Wifi interface will comply with IEEE 802.11 b/g/n capabilities while communicating at 2.4 Gigahertz. The module will provide an external antenna connection allowing a line of site communication range of up to 300 feet with a roof mounted antenna.

The module will transmit a password protected web page to a wifi enabled device (i.e. most smart phones, tablets or laptops) allowing two levels of user interaction. The firefighter level will allow vehicle monitoring of the vehicle and firefighting systems on the apparatus. The technician level will allow diagnostic access to inputs and outputs installed on the Information screen, control and information system.

The data logging capability will record faults from the engine, transmission, ABS and Information screen control and information systems as they occur. No other data will be recorded at the time the fault occurs. The data logger will provide up to 2 Gigabytes of data storage.

A USB connection will be provided on the Tech Module. It will provide a means to download data logger information and update software in the device.

**PROGNOSTICS**
A software based vehicle tool shall be provided to predict remaining life of the vehicles critical fluid and events (no exceptions).

The system shall send automatic indications to the Information screen color display and/or wireless enabled device to proactively alert of upcoming service intervals.

Prognostics shall include:

- Engine oil and filter
- Transmission oil and filter
- Pump oil (if equipped)
- Foam oil (if equipped)
- Aerial oil and filter (if equipped)
ADVANCED DIAGNOSTICS
An advanced, Windows-based, diagnostic software program shall be provided for this control system. The software shall provide troubleshooting tools to service technicians equipped with a Windows-based computer or wireless enabled device.

The service and maintenance software shall be easy to understand and use and have the ability to view system input/output (I/O) information.

INDICATOR LIGHT AND ALARM PROVE-OUT SYSTEM
A system shall be provided which automatically tests basic indicator lights and alarms located on the cab instrument panel.

VOLTAGE MONITOR SYSTEM
A voltage monitoring system shall be provided to indicate the status of the battery system connected to the vehicle's electrical load. The system shall provide visual and audible warning when the system voltage is below or above optimum levels.

The alarm shall activate if the system falls below 11.8 volts DC for more than two (2) minutes.

DEDICATED RADIO EQUIPMENT CONNECTION POINTS
There shall be three (3) studs provided in the primary power distribution center located in front of the officer for two-way radio equipment.

- The studs shall consist of the following:
  - 12-volt 40-amp battery switched power
  - 12-volt 60-amp ignition switched power
  - 12-volt 60-amp direct battery power

There shall also be a 12-volt 100-amp ground stud located in or adjacent to the power distribution center.

ENHANCED SOFTWARE
The solid-state control system shall include the following software enhancements:

All perimeter lights and scene lights (where applicable) shall be deactivated when the parking brake is released.

Cab and crew cab dome lights shall remain on for ten (10) seconds for improved visibility after the doors close. The dome lights shall dim after ten (10) seconds or immediately if the vehicle is put into gear.
Cab and crew cab perimeter lights shall remain on for ten (10) seconds for improved visibility after the doors close. The dome lights shall dim after ten (10) seconds or immediately if the vehicle is put into gear.

**EMI/RFI PROTECTION**

To prevent erroneous signals from crosstalk contamination and interference, the electrical system shall meet, at a minimum, SAE J551/2, thus reducing undesired electromagnetic and radio frequency emissions. An advanced electrical system shall be used to ensure radiated and conducted electromagnetic interference (EMI) or radio frequency interference (RFI) emissions are suppressed at their source.

The apparatus shall have the ability to operate in the electromagnetic environment typically found in fire ground operations to ensure clean operations. The electrical system shall meet, without exceptions, electromagnetic susceptibility conforming to SAE J1113/25 Region 1, Class C EMR for 10KHz-1GHz to 100 Volts/Meter. The vehicle OEM, upon request, shall provide EMC testing reports from testing conducted on an entire apparatus and shall certify that the vehicle meets SAE J551/2 and SAE J1113/25 Region 1, Class C EMR for 10KHz-1GHz to 100 Volts/Meter requirements. Component and partial (incomplete) vehicle testing is not adequate as overall vehicle design can impact test results and thus is not acceptable by itself.

EMI/RFI susceptibility shall be controlled by applying appropriate circuit designs and shielding. The electrical system shall be designed for full compatibility with low-level control signals and high-powered two-way radio communication systems. Harness and cable routing shall be given careful attention to minimize the potential for conducting and radiated EMI/RFI susceptibility.

**ELECTRICAL**

All 12-volt electrical equipment installed by the apparatus manufacturer shall conform to modern automotive practices. All wiring shall be high temperature crosslink type. Wiring shall be run, in loom or conduit, where exposed and have grommets where wire passes through sheet metal. Automatic reset circuit breakers shall be provided which conform to SAE Standards. Wiring shall be color, function and number coded. Function and number codes shall be continuously imprinted on all wiring harness conductors at 2.00" intervals. Exterior exposed wire connectors shall be positive locking, and environmentally sealed to withstand elements such as temperature extremes, moisture and automotive fluids.

Electrical wiring and equipment shall be installed utilizing the following guidelines:

1. All holes made in the roof shall be caulked with silicon, rope caulk is not acceptable. Large fender washers, liberally caulked, shall be used when fastening equipment to the underside of the cab roof.
2. Any electrical component that is installed in an exposed area shall be mounted in a manner that shall not allow moisture to accumulate in it. Exposed area shall be defined as any location outside of the cab or body.

3. Electrical components designed to be removed for maintenance shall not be fastened with nuts and bolts. Metal screws shall be used in mounting these devices. Also a coil of wire shall be provided behind the appliance to allow them to be pulled away from mounting area for inspection and service work.

4. Corrosion preventative compound shall be applied to all terminal plugs located outside of the cab or body. All non-waterproof connections shall require this compound in the plug to prevent corrosion and for easy separation (of the plug).

5. All lights that have their sockets in a weather exposed area shall have corrosion preventative compound added to the socket terminal area.

6. All electrical terminals in exposed areas shall have silicon (1890) applied completely over the metal portion of the terminal.

All lights and reflectors, required to comply with Federal Motor Vehicle Safety Standard #108, shall be furnished. Rear identification lights shall be recessed mounted for protection. Lights and wiring mounted in the rear bulkheads shall be protected from damage by installing a false bulkhead inside the rear compartments.

An operational test shall be conducted to ensure that any equipment that is permanently attached to the electrical system is properly connected and in working order.

The results of the tests shall be recorded and provided to the city at time of delivery.

**BATTERY SYSTEM**

There shall be four (4) 12 volt Exide®, Model 31S950X3W, batteries that include the following features shall be provided:

- 950 CCA, cold cranking amps
- 190 amp reserve capacity
- High cycle
- Group 31
- Rating of 3800 CCA at 0 degrees Fahrenheit
- 760 minutes of reserve capacity
- Threaded stainless steel studs

Each battery case shall be a black polypropylene material with a vertically ribbed container for increased vibration resistance. The cover shall be manifold vented with a central venting location to allow a 45 degree tilt capacity.
The inside of each battery shall consist of a "maintenance free" grid construction with poly wrapped separators and a flooded epoxy bottom anchoring for maximum vibration resistance.

**BATTERY SYSTEM**
There shall be a single starting system with an ignition switch and starter button provided and located on the cab instrument panel.

**MASTER BATTERY SWITCH**
There shall be a master battery switch provided within the cab within easy reach of the driver to activate the battery system.

An indicator light shall be provided on the instrument panel to notify the driver of the status of the battery system.

**BATTERY COMPARTMENTS**
The batteries shall be stored in well-ventilated compartments that are located under the cab and bolted directly to the chassis frame. The battery compartments shall be constructed of 3/16" steel plate and be designed to accommodate a maximum of three (3) group 31 batteries in each compartment. The compartments shall include formed fit heavy-duty roto-molded polyethylene battery tray inserts with drains on each side of the frame rails. The batteries shall be mounted inside of the roto-molded trays.

**JUMPER STUDS**
One (1) set of battery jumper studs with plastic color-coded covers shall be installed on the battery box on the driver's side. This shall allow enough room for easy jumper cable access.

**BATTERY CHARGER**
There shall be a Kussmaul™ 1200, Model 091-187-12-Remote, battery charger provided. A bar graph display indicating the state of charge shall be provided.

The charger shall have a maximum output of 40 amps and a fully automatic regulation.

The battery charger shall be wired to the AC shoreline inlet through an AC receptacle adjacent to the battery charger.

The battery charger shall be located in the left body compartment mounted on the left wall as high as possible.

The battery charger indicator shall be located near the driver's seat riser with special bracketry.
KUSSMAUL AUTO EJECT FOR SHORELINE
There shall be one (1) Kussmaul Model 091-20WP-120, 20 amp 120 volt AC shoreline inlet(s) provided to operate the dedicated 120 volt AC circuits on the apparatus.

The shoreline inlet(s) shall include red weatherproof flip up cover.

There shall be a release solenoid wired to the vehicle's starter to eject the AC connector when the engine is starting.

The shoreline(s) shall be connected to battery charger.

There shall be a mating connector body supplied with the loose equipment.

There shall be a label installed near the inlet(s) that state the following:

- Line Voltage
- Current Ratting (amps)
- Phase
- Frequency

The shoreline receptacle shall be located on the driver side of cab, above wheel.

POWER DISCONNECT
A Kussmaul, Model 091-18-098 "Dynamic" power disconnect shall be supplied and installed within the auto-eject power line. It shall disconnect the load shortly before the auto-eject is ejected and shall also include a time delay, which connects the load after the auto-eject is plugged in.

ALTERNATOR
A Delco Remy®, Model 55SI, alternator shall be provided. It shall have a rated output current of 430 amps, as measured by SAE method J56. The alternator shall feature an integral regulator and rectifier system that has been tested and qualified to an ambient temperature of 257 degrees Fahrenheit (125 degrees Celsius). The alternator shall be connected to the power and ground distribution system with heavy-duty cables sized to carry the full rated alternator output.

ELECTRONIC LOAD MANAGER
An electronic load management (ELM) system shall be provided that monitors the vehicles 12-volt electrical system, automatically reducing the electrical load in the event of a low voltage condition, and automatically restoring the shed electrical loads when a low voltage condition expires. This ensures the integrity of the electrical system.
For improved reliability and ease of use, the load manager system shall be an integral part of the vehicle's solid state control system requiring no additional components to perform load management tasks. Load management systems which require additional components shall not be allowed.

The system shall include the following features:

- System voltage monitoring.
- A shed load shall remain inactive for a minimum of five minutes to prevent the load from cycling on and off.
- Sixteen available electronic load shedding levels.
- Priority levels can be set for individual outputs.
- High Idle to activate before any electric loads are shed and deactivate with the service brake.
  - If enabled:
    - "Load Man Hi-Idle On" shall display on the information center.
    - Hi-Idle shall not activate until 30 seconds after engine start up.
- Individual switch "on" indicator to flash when the particular load has been shed.
- The information center indicates system voltage.

The information center, where applicable, includes a "Load Manager" screen indicating the following:

- Load managed items list, with priority levels and item condition.
- Individual load managed item condition:
  - ON = not shed
  - SHED = shed

**SEQUENCER**

A sequencer shall be provided that automatically activates and deactivates vehicle loads in a preset sequence thereby protecting the alternator from power surges. This sequencer operation shall allow a gradual increase or decrease in alternator output, rather than loading or dumping the entire 12 volt load to prolong the life of the alternator.

For improved reliability and ease of use, the load sequencing system shall be an integral part of the vehicle's solid state control system requiring no additional components to perform load sequencing tasks. Load sequencing systems which require additional components shall not be allowed.
Emergency light sequencing shall operate in conjunction with the emergency master light switch. When the emergency master switch is activated, the emergency lights shall be activated one by one at half-second intervals. Sequenced emergency light switch indicators shall flash while waiting for activation.

When the emergency master switch is deactivated, the sequencer shall deactivate the warning light loads in the reverse order.

Sequencing of the following items shall also occur, in conjunction with the ignition switch, at half-second intervals:

- Cab Heater and Air Conditioning
- Crew Cab Heater (if applicable)
- Crew Cab Air Conditioning (if applicable)
- Exhaust Fans (if applicable)
- Third Evaporator (if applicable)

**HEADLIGHTS**
There shall be four (4) JW Speaker Evolution, Model 8630, 5.60" round LED lights with polycarbonate lenses mounted in the front chrome trim housing on each side of the cab grille:

- One (1) part number 0549911, low and high beam installed in the outside position on the driver's side.
- One (1) part number 0549911, low and high beam installed in the inside position on the driver's side.
- One (1) part number 0549211, low and high beam installed in the inside position on the passenger's side.
- One (1) part number 0549211, low and high beam installed in the outside position on the passenger's side.

**DIRECTIONAL LIGHTS**
There shall be two (2) Whelen® 600 series, LED combination directional/marker lights provided. The lights shall be located on the outside cab corners, next to the headlights.

The color of the lenses shall be the same color as the LED's.
INTERMEDIATE LIGHT
There shall be two (2) Weldon, Model 9186-8580-29, amber LED turn signal marker lights furnished, one (1) each side, in the rear fender panel. The light shall double as a turn signal and marker light.

CAB CLEARANCE/MARKER/ID LIGHTS
There shall be seven (7) amber LED lights provided to indicate the presence and overall width of the vehicle in the following locations:

- Three (3) amber LED identification lights shall be installed in the center of the cab above the windshield.
- Two (2) amber LED clearance lights shall be installed, one (1) on each outboard side of the cab above the windshield.
- Two (2) amber LED marker lights shall be installed, one (1) on each side above the cab doors.

REAR CLEARANCE/MARKER/ID LIGHTING
There shall be three (3) LED identification lights located at the rear installed per the following:

- As close as practical to the vertical centerline
- Centers spaced not less than 6.00" or more than 12.00" apart
- Red in color
- All at the same height

There shall be two (2) LED lights installed at the rear of the apparatus used as clearance lights located at the rear of the apparatus per the following:

- To indicate the overall width of the vehicle
- One (1) each side of the vertical centerline
- As near the top as practical
- Red in color
- To be visible from the rear
- All at the same height

There shall be two (2) LED lights installed on the side of the apparatus used as marker lights as close to the rear as practical per the following:

- To indicate the overall length of the vehicle
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- One (1) each side of the vertical centerline
- As near the top as practical
- Red in color
- To be visible from the side
- All at the same height

The lights shall be mounted with no guard.

There shall be two (2) red reflectors located on the rear of the truck facing to the rear. One (1) each side, as far to the outside as practical, at a minimum of 15.00”, but no more than 60.00”, above the ground.

There shall be two (2) red reflectors located on the side of the truck facing to the side. One (1) each side, as far to the rear as practical, at a minimum of 15.00", but no more than 60.00", above the ground.

Per FMVSS 108 and CMVSS 108 requirements.

MARKER LIGHTS
There shall be one (1) pair of amber and red LED marker lights with rubber arm, located rear of truck, one each side, as far rearward as possible.. The amber lens shall face the front and the red lens shall face the rear of the truck.

These lights shall be activated with the running lights of the vehicle.

REAR FMVSS LIGHTING
There shall be two (2) wrap around tri-cluster LED modules provided on the face of the rear body compartments.

Each tri-cluster shall include the following:

- One (1) LED stop/tail light
- One (1) LED directional light
- One (1) LED backup light

LICENSE PLATE BRACKET
There shall be one (1) license plate bracket mounted on the rear of the body.

A white LED light shall illuminate the license plate. A polished stainless steel light shield shall be provided over the light that shall direct illumination downward, preventing white light to the rear.
BACK-UP ALARM
A PRECO, Model 1040, solid-state electronic audible back-up alarm that actuates when the truck is shifted into reverse shall be provided. The device shall sound at 60 pulses per minute and automatically adjust its volume to maintain a minimum ten (10) dBA above surrounding environmental noise levels.

CAB PERIMETER SCENE LIGHTS
There shall be four (4) Amdor LumaBar H2O, Model AY-9500-020, 20.00" white LED strip lights provided, one (1) for each cab door.

These lights shall be activated automatically when the battery switch is on and the exit doors are opened or by the same means as the body perimeter scene lights.

PUMP HOUSE PERIMETER LIGHTS
There shall be one (1) Amdor LumaBar H2O, Model AY-9500-020, 20.00" LED weatherproof strip light with bracket provided under the passenger's side pump panel running board.

The light shall be controlled by the same means as the body perimeter lights.

BODY PERIMETER SCENE LIGHTS
There shall be two (2) Amdor LumaBar H2O™, Model AY-9500-020, 20.00" 12 volt DC LED strip lights provided.

The lights shall be mounted in the following locations:

- One (1) light under the driver's side turntable access steps
- One (1) light under the passenger's side turntable access steps

The perimeter scene lights shall be activated when the parking brake is applied.

STEP LIGHTS
Two (2) white LED step lights shall be provided, one (1) on each side of the front body.

In order to ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15" x 15" square placed ten (10) inches below the light and a minimum of 1.5 fc covering an entire 30" x 30" square at the same ten (10) inch distance below the light.

The lights shall be actuated with the pump panel light switch.

All other steps on the apparatus shall be illuminated per the current edition of NFPA 1901.
### 12 VOLT LIGHTING – DRIVER & PASSENGER SIDE FLOOD LIGHT
There shall be two (2) Whelen® Pioneer™ Series, Model PCP2P*, 12 volt DC LED floodlight(s) installed on the apparatus.

The painted parts of this light assembly to be white.
The lights shall be installed on the driver's and passenger's sides rear of cab.
The lights to be installed on a side body/surface mount push-up pole(s).
The length of the outside pole to be 20.00".
The outside pole length to be 57.00" long or as long as practical to fit in the location selected.
The light pole(s) to be installed without handle holder(s).

The lights shall be controlled by the following:
- Driver and passenger side light shall be independently switched at the driver's side switch panel
- Driver and passenger side lights shall be independently switched at the pump operator's panel
- Passenger side light shall have switch on passenger side pump panel

These light(s) may be load managed when the parking brake is applied.

### 12 VOLT LIGHTING – CAB MOUNTED LED LIGHTS DRIVERS SIDE
There shall be one (1) Whelen, Model PCPSM1*, 12 volt surface mounted LED combination spot/flood light(s) located between crew and driver's door. The lights shall be mounted with chrome flange(s).

The light(s) selected above shall be controlled by the following:
- a switch at the driver's side switch panel
- a switch at the driver's side pump panel

These light(s) may be load managed when the parking brake is set.

### 12 VOLT LIGHTING – CAB MOUNTED LED LIGHTS PASSENGER SIDE
There shall be one (1) Whelen, Model PCPSM1*, 12 volt surface mounted LED combination spot/flood light(s) located between crew and officer door. The lights shall be mounted with chrome flange(s).

The light(s) selected above shall be controlled by the following:
• a switch at the driver's side switch panel
• a switch at the driver's side pump panel
• a switch at the passenger side pump panel

These light(s) may be load managed when the parking brake is set.

**12 VOLT LIGHTING – LED SPOT/FLOOD LIGHT**

There shall be one (1) Whelen® Pioneer™, Model PCP2P, 12 volt LED combination spot/flood light(s) provided on the front visor, centered.

The painted parts of this light assembly to be white.

The light(s) shall be controlled by the following:

• a switch at the driver's side switch panel
• a switch at the pump operator's panel

These light(s) may be load managed when the parking brake is set.

**DECK LIGHTS**

There shall be two (2) Whelen, Model PFBP12C, white 12 volt DC LED floodlights with swivel mount provided at the rear of the hose bed, one (1) each side.

The lights shall be activated by a control from:

• a switch at the rear of the truck
• a switch located at the driver side switch panel

These light(s) may be load managed when the parking brake is set.

**WATER TANK**

The water tank shall have a capacity of 500 gallons and shall be constructed of polypropylene plastic in a rectangular shape.

The joints and seams shall be nitrogen welded inside and out.

The tank shall be baffled in accordance with current NFPA 1901 requirements.

The baffles shall have vent openings at both the top and bottom of each baffle to permit movement of air and water between compartments.

The longitudinal partitions shall be constructed of 0.38" polypropylene plastic and extend from the bottom of the tank through the top cover to allow positive welding.

The transverse partitions extend from 4.00" off the bottom to the underside of the top cover.
All partitions interlock and shall be welded to the tank bottom and sides.

The tank top shall be constructed of 0.50" polypropylene.

It shall be recessed 0.38" and shall be welded to the tank sides and the longitudinal partitions.

It shall be supported to keep it rigid during fast filling conditions.

Construction shall include 2.00" polypropylene dowels spaced no more than 30.00" apart and welded to the transverse partitions.

Two of the dowels shall be drilled and tapped (0.50" diameter, 13.00" deep) to accommodate lifting eyes.

A sump shall be provided at the bottom of the water tank. The sump shall include a drain plug and the tank outlet.

Tank shall be installed in a fabricated "cradle" assembly constructed of structural steel.

Sufficient crossmembers are provided to properly support bottom of tank.

Crossmembers are constructed of steel bar channel or rectangular tubing.

Tank "floats" in cradle to avoid torsional stress caused by chassis frame flexing.

Rubber cushions, 0.50" thick x 3.00" wide, shall be placed on all horizontal surfaces that the tank rests on.

Stops are provided to prevent an empty tank from bouncing excessively while moving vehicle.

Tank mounting system is approved by the manufacturer.

Fill tower shall be constructed of .50" polypropylene and shall be a minimum of 8.00" wide x 14.00" long.

Fill tower shall be furnished with a .25" thick polypropylene screen and a hinged cover.

An overflow pipe, constructed of 4.00" schedule 40 polypropylene, shall be installed approximately halfway down the fill tower and extend through the water tank and exit to the rear of the rear axle.

**HOSE BED**

The hose bed shall be fabricated of 0.125" 5052-H32 aluminum with a tensile strength range of 31,000 to 38,000 psi.
The sides of the hose bed shall not form any portion of the fender compartments.

The upper and rear edges of the hose bed side panels shall have a double break for rigidity.

The hose bed shall be located ahead of the ladder turntable.

There shall be a hose chute to the side and rear of the hose bed on both the driver and passenger side to allow for payout/removal of the hose.

The hose bed flooring shall consist of removable aluminum grating with a top surface that is perforated to aid in hose aeration.

Hose capacity shall be a minimum of 1000' of 5.00" large diameter hose.

**AERIAL HOSE BED HOSE RERAINT**
The hose in the hose bed shall be restrained by a black nylon Velcro® strap at the top of the hose bed and a 1.00" black nylon web design with a 2.00" box pattern at the rear of one (1) hose bed(s). The Velcro strap shall be installed to the top of the hose bed side sheets. The rear webbing shall have 1.00" web straps that loop through footman loops and fasten with spring clip and hook fasteners.

**RUNNING BOARDS**
The running boards shall be fabricated of aluminum grating, with a serrated top edge, supported by structural steel angle assemblies bolted to the chassis frame rails.

Running boards shall be 12.75" deep and are spaced away from the body .50".

A riser shall be installed on the body to protect the painted surface from damage by stepping on the running boards.

The entire outer edge of the stepping surface shall be covered with bright aluminum treadplate.

**TURNTABLE STEPS**
Access to the turntable shall be provided by a set of swing-down steps on the driver side of the truck.

The access steps shall be located rearward of the compartmentation.

All steps shall have a height no greater than 14.00" from top surface to top surface.

The swing down step mechanism shall be constructed of brushed aluminum with bright aluminum steps with Morton Cass inserts.
The stepwell shall be lined with bright aluminum treadplate to act as scuffplates.

A handrail shall be provided on each side of the access steps.

Holes shall be provided in each side step plate for hand holds.

The bottom step shall have a step height not exceeding 24.00" from the ground to the top surface of the step at any time.

The steps shall be connected to the "Do Not Move Truck" indicator in the cab.

**STEP LIGHTS**
There shall be three (3) white Amdor LED step lights provided for the aerial turntable access steps.

In order to ensure exceptional illumination, each light shall provide a minimum of 25 foot-candles (fc) covering an entire 15" x 15" square placed ten (10) inches below the light and a minimum of 1.5 fc covering an entire 30" x 30" square at the same ten (10) inch distance below the light.

The step lights shall be actuated by the aerial master switch in the cab.

**SMOOTH ALUMINUM REAR WALL**
The rear wall shall be smooth aluminum.

**TOW EYES**
Two (2) rear painted tow eyes shall be located at the rear of the apparatus and shall be mounted directly to the frame rails. The inner and outer edges of the tow eyes shall be radiused.

**COMPARTMENTATION**
Compartmentation shall be fabricated of 0.125" 5052 aluminum.

Side compartments shall be an integral assembly with the rear fenders.

Circular fender liners shall be provided. For prevention of rust pockets and ease of maintenance, the fender liners shall be formed from aluminum and removable for maintenance.

Compartment flooring shall be of the sweep out design with the floor higher than the compartment door lip.

Drip protection shall be provided above the doors by means of bright aluminum extrusion, formed bright aluminum treadplate or polished stainless steel.
The top of the compartment shall be covered with bright aluminum treadplate rolled over the edges on the front, rear and outward side. These covers shall have the corners welded.

Side compartment covers shall be separate from the compartment tops.

All screws and bolts, which are not Grade 8, shall be stainless steel and where they protrude into a compartment shall have acorn nuts on the ends to prevent injury.

**UNDERBODY SUPPORT SYSTEM**

The backbone of the body support system shall begin with the aerial torque box which is the strongest component of the apparatus and is designed for sustaining maximum loads.

An aluminum body structure shall be mounted to the aerial torque box at three (3) points to create a floating substructure which shall result in an 800 lb equipment support rating per lower compartment and provide up to 0.31" accumulative floor thickness.

The three (3) point body mounting system shall consist of two (2) points in the front and one (1) in the rear. The front mounts shall attach to the top of the stabilizer H-box, and the rear mount shall attach to the rear of the torque box at the chassis centerline.

The body structure shall be mounted with neoprene elastomer isolators. These isolators shall have a broad load range, proven viability in vehicular applications, be of a fail-safe design and allow for all necessary movement in three (3) transitional and rotational modes.

The combination of the three (3) point mounting system and elastomer isolators allow the chassis and torque box to flex without driving loads into the body.

**AGGRESSIVE WALKING SURFACE**

All exterior surfaces designated as stepping, standing, and walking areas shall comply with the required average slip resistance of the current NFPA standards.

**LOUVERS**

All body compartments shall be vented to provide one (1) way airflow out of the compartment that prevents water and dirt from gaining access to the compartment.

**TESTING OF BODY DESIGN**

Body structural analysis shall be fully tested. Proven engineering and test techniques such as finite element analysis, model analysis, and strain gauging have been performed with special attention given to fatigue, life and structural integrity of the body and substructure.

The body shall be tested while loaded to its greatest in-service weight.
The criteria used during the testing procedure shall include:

- Raising opposite corners of the vehicle tires 9.00" to simulate the twisting a truck may experience when driving over a curb.

- Making a 90 degree turn, while driving at 20 mph to simulate aggressive driving conditions.

- Driving the vehicle on at 35 mph on a washboard road.

- Driving the vehicle at 55 mph on a smooth road.

- Accelerating the vehicle fully, until reaching the approximate speed of 45 mph on rough pavement.

Evidence of the actual testing techniques shall be made available upon request.

**DRIVER SIDE COMPARTMENTATION**

The full height double lap door compartment ahead of the rear wheels shall be 39.19" wide x 63.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep inside the upper portion with a clear door opening of 36.44" wide x 56.00" high.

There shall be one (1) lift-up door compartment above the wheelwell and stabilizer. The compartment shall be 83.88" wide x 25.25" high x 12.00" deep inside with a clear door opening of 81.12" wide x 19.75" high.

The full height double door compartment behind the rear wheel shall be 45.12" wide x 57.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep in the upper portion with a clear door opening of 43.38" wide x 50.00" high.

**PASSENGERS SIDE COMPARTMENTATION**

The full height double lap door compartment ahead of the rear wheels shall be 39.19" wide x 63.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep inside the upper portion with a clear door opening of 36.44" wide x 56.00" high.

There shall be one (1) lift-up door compartment above the wheelwell and stabilizer. The compartment shall be 83.88" wide x 25.25" high x 12.00" deep inside with a clear door opening of 81.12" wide x 12.00" high.

The full height double door compartment behind the rear wheel shall be 45.12" wide x 57.00" high x 26.00" deep inside the lower 25.50" and 12.00" deep in the upper portion with a clear door opening of 43.38" wide x 50.00" high.
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**PASSENGER SIDE COMPARTMENT IN PLACE OF TURNTABLE STEPS**

There shall be a roll-up door compartment in place of turntable stairs that is 20.88" wide x 57.00" high x 13.50" deep inside with a clear door opening of 15.25" wide x 50.00" high.

**REAR COMPARTMENT**

A compartment shall be provided at the rear of the unit.

Compartment shall be 27.75" wide x 35.00" high x 26.25" deep with a clear door opening of 25.00" wide x 29.50" high.

The compartment shall be furnished with a satin finish roll-up door.

**SIDE COMPARTMENT DOORS**

All hinged compartment doors shall be lap style with double panel construction and fabricated of .09" 5052H32 aluminum. Doors shall be a minimum of 1.50" thick. To provide additional door strength, a "C" section reinforcement shall be installed between the outer and interior panels.

Doors shall be provided with a closed cell rubber gasket around the surface that laps onto the body. A second heavy-duty automotive rubber molding with a hollow core shall be installed on the door framing that seals onto the interior panel, to ensure a weather resisting compartment.

All compartment doors shall have polished stainless steel continuous hinge with a pin diameter of .25", that is bolted or screwed on with stainless steel fasteners. (Hinges which are welded on shall not be acceptable.) A dielectric substance shall be applied to each hinge fastener.

All door lock mechanisms shall be fully enclosed within the door panels to prevent fouling of the lock in the event equipment inside shifts into the lock area.

Doors shall be latched with recessed, polished stainless steel "D" ring handles and Eberhard 106 locks.

To prevent corrosion caused by dissimilar metals, compartment door handles shall not be attached to outer door panel with screws. A rubber gasket shall be provided between the "D" ring handle and the door.

**REAR BUMPER**

An aluminum rub rail shall be provided at the rear of the unit. It shall extend the full width of the compartments.

**COMPARTMENT LIGHTING**

There shall be eight (8) compartments with Amdor, Model AY-9220, white 12 volt DC LED compartment light strips. The lights shall be mounted with mechanical fasteners.
There shall be two (2) strip lights installed vertically in each compartment opening per the latest NFPA requirements.

The lights shall be activated when the battery switch is on and the respective compartment door is opened.

**MOUNTING TRACKS**
There shall be recessed tracks installed vertically to support the adjustable shelf(s).

Tracks shall not protrude into any compartment in order to provide the greatest compartment space and widest shelves possible.

The tracks shall be provided in each compartment except for the one that contains the pump operator's panel.

**ADJUSTABLE SHELVES**
There shall be five (5) shelves, with a capacity of 500 lb provided. The shelf construction shall consist of .188” thick aluminum with 2.00” sides. Each shelf shall as wide and as deep as the compartment space shall allow. Each shelf shall be painted spatter gray.

Each shelf shall be infinitely adjustable by means of a threaded fastener, which slides in a track.

The shelves shall be held in place by .12” thick stamped plated brackets and bolts.

The location shall be upper portion of D1, D3, P1, P3, R2.

**SLIDE-OUT FLOOR MOUNTED TRAY**
There shall be two (2) floor mounted slide-out tray(s) with 2.00” sides provided rear driver side compartment and passenger side compartment forward of rear wheels. Each tray shall be rated for up to 500lb in the extended position. The tray(s) shall be constructed of .19” aluminum with non-welded corners. The finish shall be painted to match compartment interior.

There shall be two undermount-roller bearing type slides rated at 250lb each provided. The pair of slides shall have a safety factor rating of 2.

To ensure years of dependable service, the slides shall be coated with a finish that is tested to withstand a minimum of 1,000 hours of salt spray per ASTM B117.

To ensure years of easy operation, the slides shall require no more than a 50lb force for push-in or pull-out movement when fully loaded after having been subjected to a 40 hour vibration (shaker) test under full load. The vibration drive file shall have been generated from
accelerometer data collected from a heavy truck chassis driven over rough gravel roads in an unloaded condition. Proof of compliance shall be provided.

Automatic locks shall be provided for both the "in" and "out" positions. The trip mechanism for the locks shall be located at the front of the tray for ease of use with a gloved hand.

**SWING OUT TOOLBOARD**
A swing out aluminum tool board shall be provided passenger side compartment above rear wheels and outrigger

It shall be a minimum of .188" thick with .203" diameter holes in a pegboard pattern with 1.00" centers between holes.

A 1.00" x 1.00" aluminum tube frame shall be welded to the edge of the pegboard.

The board shall be mounted on a pivoting device at the back of the compartment on the top and bottom to allow easy movement in and out of the compartment. The maximum tool load shall be 400 pounds.

The board shall have positive lock in the stowed and extended position.

The board shall be mounted stationary within the compartment.

There shall be One (1) toolboard(s) provided. The toolboard(s) shall be spatter gray painted.

**COMPARTMENT FLOOR MATTING**
Turtle Tile compartment matting shall be provided in five (5) compartment(s).

The locations will be:

- Drivers side compartment above rear wheels
- Driver side compartment forward of rear wheels
- Passenger side compartment above rear wheels
- Passenger side compartment behind rear wheels
- Rear compartment

Matting shall be provided in all shelving and in slide out trays

The color of Turtle Tile shall be black.

**PARTITION, VERTICAL COMPARTMENT**
One (1) partition shall be bolted in passenger side compartment above rear wheels 50 Inches from Front. Each partition shall be the full vertical height of the compartment.
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**ALUMINUM PEGBOARD**
Two (2) horizontally installed tracks, with .19" aluminum pegboard shall be installed on the back wall of one (1) compartments. The holes shall be .281" diameter, punched 1.00" on center. The pegboard shall be spatter gray painted. The pegboard(s) shall be located passenger side compartment above rear wheels.

Retainers shall be used to mount the pegboard to the tracks.

**RUB RAIL**
Bottom edge of the side compartments shall be trimmed with a bright aluminum extruded rub rail.

Trim shall be 3.12" high with 1.50" flanges turned outward for rigidity.

The rub rails shall not be an integral part of the body construction, which allows replacement in the event of damage.

**BODY FENDER CROWNS**
Polished stainless steel fender crowns shall be provided around the rear wheel openings.

An unpainted fender liner shall be provided to avoid paint chipping. The liners shall be removable to aid in the maintenance of rear suspension components.

A dielectric barrier shall be provided between the fender crown fasteners (screws) and the fender sheet metal to prevent corrosion.

The fender crowns shall be held in place with stainless steel screws that thread directly into a composite nut and not directly into the parent body sheet metal to eliminate dissimilar metals contact and greatly reduce the chance for corrosion.

**HARD SUCTION HOSE**
Hard suction hose shall not be required.

**HANDRAILS**
The handrails shall be 1.25" diameter anodized aluminum extrusion, with a ribbed design, to provide a positive gripping surface.

Chrome plated end stanchions shall support the handrail. Plastic gaskets shall be used between end stanchions and any painted surfaces.

Drain holes shall be provided in the bottom of all vertically mounted handrails.
Handrails shall be provided to meet NFPA 1901 section 15.8 requirements. The handrails shall be installed as noted on the sales drawing.

**AIR BOTTLE STORAGE**
A total of four (4) air bottle compartments shall be provided and located on the driver's side ahead of the rear wheel, driver's side behind the rear wheel, passenger's side ahead of the rear wheel and on the passenger's side behind the rear wheel. The air bottle compartment shall be 14.00" wide x 7.50" tall x 26.00" deep. A polished stainless steel door with a chrome plated latch shall be provided to contain the air bottle. A dielectric barrier shall be provided between the door hinge, hinge fasteners and the body sheet metal.

**EXTENSION LADDER – 35’**
There shall be a 35’, three (3) section, aluminum, Duo-Safety, Series 1225-A extension ladder provided.

**EXTENSION LADDER – 24’**
There shall be one (1) 24’, two (2) section, aluminum, Series 900-A extension ladder(s) provided.

**ROOF LADDER – 16’**
There shall be two (2), 16' aluminum, Duo-Safety, Series 875-A roof ladders provided.

**AERIAL FOLDING LADDER – 12’ FOLDING LADDER**
There shall be two (2) 12' aluminum Duo-Safety Series 585-A folding ladder(s) provided.

**GROUND LADDER STORAGE**
Ladder tunnels shall be provided at the rear of the apparatus on either side of the turntable.

Tunnels shall be capable of holding up to two (2) two-section pumper style ladders on each side not in excess of 22.00" wide or 5-13/16" in thickness.

The ladders shall be held captive top and bottom by stainless steel tracks. A polyethylene wear plate shall be provided to prevent ladders from being scuffed by contacting metal parts. The plate shall be mounted to the bottom of the entrance area of the ladder tunnels.

All ladders shall be removable individually without having to remove any other ladder.

A Velcro® strap shall be provided to help contain the ladders.

A smooth aluminum door shall be provided on each ladder tunnel.

**LIGHT IN LADDER STORAGE AREA**
There shall be one (1) Amdor LED truck light provided in ladder rack storage area.
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**PIKE POLES**
There shall be two (2) Nupla 12’ pike pole(s) provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

**8 FT PIKE POLE**
There shall be two (2) Nupla 8’ pike pole(s) provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

**6 FT PIKE POLE**
There shall be two (2) Nupla 6’ pike pole(s) provided. The pike pole(s) shall be stored in tubular holders located in the ground ladder storage compartment.

**STEPS**
A folding step shall be provided on the front of each fender compartment for access to the hose bed. The step shall be bright finished, non-skid with a black coating. The step shall incorporate an LED light to illuminate the stepping surface. The step can be used as a hand hold with two openings wide enough for a gloved hand.

Three (3) additional folding steps shall be located on the driver side front bulkhead and two (2) on the passenger side front bulkhead. The step(s) shall be bright finished, non-skid with a black coating. Each step shall incorporate an LED light to illuminate the stepping surface. The step(s) can be used as a hand hold with two openings wide enough for a gloved hand.

**PUMP**
Pump shall be a Waterous CSU, 1500 gpm single (1) stage midship mounted centrifugal type.

Pump shall be the class "A" type.

Pump shall deliver the percentage of rated discharge at pressures indicated below:

- 100% of rated capacity at 150 psi net pump pressure.
-70% of rated capacity at 200 psi net pump pressure.
-50% of rated capacity at 250 psi net pump pressure.

Pump body shall be close-grained gray iron, bronze fitted, and horizontally split in two (2) sections for easy removal of the entire impeller shaft assembly (including wear rings).

Pump shall be designed for complete servicing from the bottom of the truck, without disturbing the pump setting or apparatus piping.
Pump case halves shall be bolted together on a single horizontal face to minimize chance of leakage and facilitate ease of reassembly. No end flanges shall be used.

Discharge manifold of the pump shall be cast as an integral part of the pump body assembly and shall provide a minimum of three (3) 3.50" openings for flexibility in providing various discharge outlets for maximum efficiency.

The three (3) 3.50" openings shall be located as follows: one (1) outlet to the right of the pump, one (1) outlet to the left of the pump, and one (1) outlet directly on top of the discharge manifold.

Impeller shaft shall be stainless steel, accurately ground to size. It shall be supported at each end by sealed, anti-friction ball bearings for rigid precise support. Impeller shall have flame plated hubs assuring maximum pump life and efficiency despite any presence of abrasive matter in the water supply.

Bearings shall be protected from water and sediment by suitable stuffing boxes, flinger rings, and oil seals. No special or sleeve type bearings shall be used.

Stuffing boxes shall be of the conventional two (2) piece, split-gland type, to permit adjustment or replacement of Grafoil packing without disturbing the pump. Water shall be fed into stuffing box lantern rings for proper lubrication and cooling when the pump is operating.

Lantern rings shall be located at the inner ends of the stuffing boxes, to avoid having to remove them when replacing pump packing.

Wear rings shall be bronze and easily replaceable to restore original pump efficiency and eliminate the need to replace the entire pump casing due to wear.

**PUMP TRANSMISSION**

Pump transmission shall be made of a three (3) piece, aluminum, horizontally split casing. Power transfer to pump shall be through a high strength Morse HY-VO silent drive chain.

Drive shafts shall be a minimum of 2.35" diameter hardened and ground alloy steel. All shafts shall be ball bearing supported. The case shall be designed as to eliminate the need for water cooling.

**AIR PUMP SHIFT**

Pump shift engagement shall be made by a two (2) position sliding collar, actuated pneumatically (by air pressure), with a three (3) position air control switch located in the cab. A manual back-up shift control shall also be located on the pump operator's pump panel.
Two (2) indicator lights shall be provided adjacent to the pump shift inside the cab. One (1) green light shall indicate the pump shift has been completed and be labeled "pump engaged". The second green light shall indicate when the pump has been engaged, and that the chassis transmission is in pump gear. This indicator light shall be labeled "OK to pump".

Another green indicator light shall be installed adjacent to the hand throttle on the pump panel and indicate either the pump is engaged and the road transmission is in pump gear, or the road transmission is in neutral and the pump is not engaged. This indicator light shall be labeled "Warning: Do not open throttle unless light is on".

The pump shift control in the cab shall be illuminated to meet NFPA requirements.

**TRANSMISSION LOCK-UP**
The direct gear transmission lock-up for the fire pump operation shall engage automatically when the pump shift control in the cab is activated.

**AUXILIARY COOLING SYSTEM**
A supplementary heat exchange cooling system shall be provided to allow the use of water from the discharge side of the pump for cooling the engine water. Heat exchanger shall be cylindrical type and shall be a separate unit. It shall be installed in the pump or engine compartment with the control located on the pump operator's control panel. Exchanger shall be plumbed to the master drain valve.

**INTAKE RELIEF VALVE**
An Elkhart relief valve shall be installed on the suction side of the pump preset at 125 psig.

Relief valve shall have a working range of 75 psig to 250 psig.

Outlet shall terminate below the frame rails with a 2.50" National Standard hose thread adapter and shall have a "do not cap" warning tag.

Control shall be located behind an access door at a side pump panel.

**PRESSURE CONTROLLER**
A Pressure Governor shall be provided. An electric pressure governor shall be provided which is capable of automatically maintaining a desired preset discharge pressure in the water pump. When operating in the pressure control mode, the system shall automatically maintain the discharge pressure set by the operator (within the discharge capabilities of the pump and water supply) regardless of flow, within the discharge capacities of the water pump and water supply.
A pressure transducer shall be installed in the water discharge of the pump. The transducer continuously monitors pump pressure sending a signal to the Electronic Control Module (ECM).

The governor can be used in two (2) modes of operation, RPM mode and pressure modes.

In the RPM mode, the governor can be activated after vehicle parking brake has been set. When in this mode, the governor shall maintain the set engine speed, regardless of engine load (within engine operation capabilities).

In the pressure mode, the governor system can only operate after the fire pump has been engaged and the vehicle parking brake has been set. When in the pressure mode, the pressure controller monitors the pump pressure and varies engine speed to maintain a precise pump pressure. The pressure controller shall use a quicker reacting J1939 database for engine control.

A preset feature allows a predetermined pressure or rpm to be set.

A pump cavitation protection feature is also provided which shall return the engine to idle should the pump cavitate. Cavitation is sensed by the combination of pump pressure below 30 psi and engine speed above 2000 rpm for more than five (5) seconds.

The throttle shall be a vernier style control, with a large control knob for use with a gloved hand. A throttle ready light shall be provided adjacent to the throttle control. A large 0.75" RPM display shall be provided to be visible at a glance.

Check engine, and stop engine indicator lights shall be provided for easy viewing.

Large 0.75" push buttons shall be provided for menu, mode, preset, and silence selections.

The water tank level indicator shall be incorporated in the pressure governor.

A fuel level indicator shall be incorporated in the pressure controller.

A pump hour meter shall be incorporated in the pressure controller.

The pressure controller shall incorporate monitoring for engine temperature, oil pressure, fuel level alarm, and voltage. Pump monitoring shall include, pump gearcase temperature, error codes, diagnostic data, pump service reminders, and time stamped data logging, to allow for fast accurate trouble shooting. It shall also notify the driver/engineer of any problems with the engine and the apparatus. Complete understandable messages shall be provided in a 20-character display, providing for fewer abbreviations in the messages. An automatic dim feature shall be included for night operations.
The pressure controller shall include a USB port for easy software upgrades, which can be downloaded through a USB memory stick, eliminating the need for a laptop for software installations.

A complete interactive manual shall be provided with the pressure controller.

**PRIMING PUMP**
The priming pump shall be a Trident Emergency Products compressed air powered, high efficiency, multistage venturi based AirPrime System, conforming to standards outlined in the current edition of NFPA 1901.

All wetted metallic parts of the priming system are to be of brass and stainless steel construction.

One (1) priming control shall open the priming valve and start the pump primer.

**PUMP MANUALS**
There shall be a total of two (2) pump manuals provided by the pump manufacturer and furnished with the apparatus. The manuals shall be provided by the pump manufacturer in the form of two (2) CDs. Each manual shall cover pump operation, maintenance, and parts.

**PLUMBING**
All inlet and outlet plumbing, 3.00" and smaller, shall be plumbed with either stainless steel pipe or synthetic rubber hose reinforced with high-tensile polyester braid. Small diameter secondary plumbing such as drain lines shall be stainless steel, brass or hose.

Where vibration or chassis flexing may damage or loosen piping or where a coupling is required for servicing, the piping shall be equipped with victaulic or rubber couplings.

Plumbing manifold bodies shall be ductile cast iron or stainless steel.

All lines shall drain through a master drain valve or shall be equipped with individual drain valves. All individual drain lines for discharges shall be extended with a hose to drain below the chassis frame.

All water carrying gauge lines shall be of flexible polypropylene tubing.

**MAIN PUMP INLETS**
A 6.00" pump manifold inlet shall be provided on each side of the vehicle. The suction inlets shall include removable die cast zinc screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump.
MAIN PUMP INLET CAP
The main pump inlets shall have National Standard Threads with a long handle chrome cap.

The cap shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).

SHORT SUCTION TUBE
The suction tubes on the mid-ship pump shall have short suction tubes to allow for installation of adapters without excessive overhang.

VALVES
All ball valves shall be Akron® Brass in-line valves. The Akron valves shall be the 8000 series heavy-duty style with a stainless steel ball and a simple two-seat design. No lubrication or regular maintenance is required on the valve.

Valves shall have a ten (10) year warranty.

LEFT SIDE INLET
There shall be one (1) auxiliary inlet with a 2.50" valve at the left side pump panel, terminating with a 2.50" (F) National Standard hose thread adapter.

The auxiliary inlet shall be provided with a strainer, chrome swivel and plug.

RIGHT SIDE INLET
There shall be one (1) auxiliary inlet with a 2.50" valve at the right side pump panel, terminating with a 2.50" (F) National Standard hose thread adapter.

The auxiliary inlet shall be provided with a strainer, chrome swivel and plug.

The location of the valve for the one (1) inlet shall be recessed behind the pump panel.

INLET CONTROL
The side auxiliary inlet(s) shall incorporate a quarter-turn ball valve with the control located at the inlet valve. The valve operating mechanism shall indicate the position of the valve.

INLET BLEEDER VALVE
A 0.75" bleeder valve shall be provided for each side gated inlet. The valves shall be located behind the panel with a swing style handle control extended to the outside of the panel. The handles shall be chrome plated and provide a visual indication of valve position. The swing handle shall provide an ergonomic position for operating the valve without twisting the wrist and provides excellent leverage. The water discharged by the bleeders shall be routed below the chassis frame rails.
TANK TO PUMP
The booster tank shall be connected to the intake side of the pump with heavy duty piping and a quarter turn 3.00" full flow line valve with the control remotely located at the operator's panel. Tank to pump line shall run straight (no elbows) from the pump into the front face of the water tank and angle down into the tank sump. A rubber coupling shall be included in this line to prevent damage from vibration or chassis flexing.

A check valve shall be provided in the tank to pump supply line to prevent the possibility of "back filling" the water tank.

TANK REFILL
A 1.50" combination tank refill and pump re-circulation line shall be provided, using a quarter-turn full flow ball valve controlled from the pump operator's panel.

LEFT SIDE DISCHARGE OUTLETS
There shall be two (2) discharge outlets with a 2.50" valve on the left side of the apparatus, terminating with a 2.50" (M) National Standard hose thread adapter.

RIGHT SIDE DISCHARGE OUTLETS
There shall be two (2) discharge outlets with a 2.50" valve on the right side of the apparatus, terminating with a 2.50" (M) National Standard hose thread adapter.

FRONT DISCHARGE OUTLET
There shall be one (1) 1.50" discharge outlet piped to the front of the apparatus and located in the center bumper tray.

Plumbing shall consist of 2.00" piping and flexible hose with a 2.00" ball valve with control at the pump operator's panel. A fabricated weldment made of stainless steel pipe shall be used in the plumbing where appropriate. The piping shall terminate with a 1.50" NST with 90 degree stainless steel swivel.

There shall be Class 1 automatic drains provided at all low points of the piping.

DISCHARGE CAPS
Chrome plated, rocker lug, caps with chains shall be furnished for all side discharge outlets.

The caps shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).
OUTLET BLEEDER VALVE
A 0.75" bleeder valve shall be provided for each outlet 1.50" or larger. Automatic drain valves are acceptable with some outlets if deemed appropriate with the application.

The valves shall be located behind the panel with a swing style handle control extended to the outside of the side pump panel. The handles shall be chrome plated and provide a visual indication of valve position. The swing handle shall provide an ergonomic position for operating the valve without twisting the wrist and provides excellent leverage. Bleeders shall be located at the bottom of the pump panel. They shall be properly labeled identifying the discharge they are plumbed in to. The water discharged by the bleeders shall be routed below the chassis frame rails.

LEFT SIDE OUTLET ELBOWS
The 2.50" discharge outlets located on the left side pump panel shall be furnished with a 2.50" (F) National Standard hose thread x 2.50" (M) National Standard hose thread, chrome plated, 45 degree elbow.

The elbow shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).

RIGHT SIDE OUTLET ELBOWS
The 2.50" discharge outlets located on the right side pump panel shall be furnished with a 2.50" (F) National Standard hose thread x 2.50" (M) National Standard hose thread, chrome plated, 45 degree elbow.

The elbow shall incorporate a thread design to automatically relieve stored pressure in the line when disconnected (no exception).

DISCHARGE OUTLET CONTROLS
The discharge outlets shall incorporate a quarter-turn ball valve with the control located at the pump operator's panel. The valve operating mechanism shall indicate the position of the valve.

If a handwheel control valve is used, the control shall be a minimum of a 3.9" diameter stainless steel handwheel with a dial position indicator built in to the center of the handwheel.

AERIAL OUTLET
The aerial waterway shall be plumbed from the pump to the water tower line with 5.00" pipe and a 4.00" Akron valve. The handwheel control for the waterway valve shall be located at the pump operator's panel.

An indicator shall be provided to show the position of the valve.


### CROSSLAY HOSE BEDS

Two (2) crosslays with 1.50" outlets shall be provided. The width of each crosslay shall be a **MINIMUM of 7 3/4" WIDE**. Each bed to be capable of carrying 200' of 1.75" double jacketed hose and shall be plumbed with 2.00" i.d. pipe and gated with a 2.00" quarter turn ball valve.

Outlets to be equipped with a 1.50" National Standard hose thread 90 degree swivel located in the hose bed so that hose may be removed from either side of apparatus.

The crosslay controls shall be at the pump operator's panel.

The center crosslay dividers shall be fabricated of 0.25" aluminum and shall provide adjustment from side to side. The divider shall be unpainted with a brushed finish.

Vertical scuffplates, constructed of stainless steel shall be provided at the front and rear ends of the bed on each side of vehicle.

Crosslay bed flooring shall consist of removable perforated brushed aluminum.

### 2.50" CROSSLAY HOSE BED

One (1) crosslay with 2.50" outlets shall be provided. The width of the crosslay shall be a **MINIMUM OF 11" WIDE**. This bed to be capable of carrying 200' of 2.50" double jacketed hose and shall be plumbed with 2.50" i.d. pipe and gated with a 2.50" quarter turn ball valve.

Outlet to be equipped with a 2.50" National Standard hose thread 90 degree swivel located in the hose bed so that hose may be removed from either side of apparatus.

The crosslay control shall be at the pump operator's panel.

The center crosslay dividers shall be fabricated of 0.25" aluminum and shall provide adjustment from side to side. The divider shall be unpainted with a brushed finish. The remainder of the crosslay bed shall be painted job color.

Stainless steel vertical scuffplates shall be provided at hose bed ends (each side of vehicle). Bottom of hose bed ends (each side) shall also be equipped with a stainless steel scuffplate.

Crosslay bed flooring shall consist of removable perforated brushed aluminum.

### CROSSLAY HOSE RESTRAINT

A 2.00" black nylon webbing design restraint shall be provided on the ends of three (3) crosslay(s) to secure the hose during travel. The webbing assembly is to be attached at the bottom of the crosslays with footman loops with a permanent attachment and is to attach at the top with two (2) seat belt buckles on the upper corners. The female end of the seat belt buckle
shall be permanently attached at the top of the opening. Orange nylon straps shall be attached to the buckles to release the webbing.

**CROSSLAY HOSE RESTRAINT TOP**
There shall be two (2) 2.00" wide black nylon straps with Velcro® fasteners provided across the top to secure the hose during travel. The straps shall extend from the front to back across the top of the hosebed(s). Footman loops shall be provided on the ends on the straps at the front and back of the opening.

**FOAM SYSTEM**
A foam system shall not be required on this apparatus.

**PUMP COMPARTMENT**
The pump compartment shall be separate from the hose body and compartments so that each may flex independently of the other. The pump compartment shall be constructed of the same material as the body compartmentation.

The pump compartment substructure shall be a fabricated assembly of steel tubing, angles and channels which supports both the fire pump and the side running boards.

The pump compartment shall be mounted on the chassis frame rails with rubber biscuits in a four point pattern to allow for chassis frame twist.

Pump compartment, pump, plumbing and gauge panels shall be removable from the chassis in a single assembly.

**PUMP MOUNTING**
Pump shall be mounted to a substructure which shall be mounted to the chassis frame rail using rubber isolators. The mounting shall allow chassis frame rails to flex independently without damage to the fire pump.

**LEFT SIDE PUMP CONTROL PANELS**
All pump controls and gauges shall be located at the left (driver's) side of the apparatus and properly identified.

Layout of the pump control panel shall be ergonomically efficient and systematically organized.

The pump operator's control panel shall be removable in two (2) main sections for ease of maintenance:

The upper section shall contain sub panels for the mounting of the pump pressure control device, engine monitoring gauges, electrical switches, and foam controls (if applicable). Sub panels
shall be removable from the face of the pump panel for ease of maintenance. Below the sub panels shall be located all valve controls and line pressure gauges.

The lower section of the panel shall contain all inlets, outlets, and drains.

All push/pull valve controls shall have 1/4 turn locking control rods with polished chrome plated zinc tee handles. Guides for the push/pull control rods shall be chrome plated zinc castings securely mounted to the pump panel. Push/pull valve controls shall be capable of locking in any position. The control rods shall pull straight out of the panel and shall be equipped with universal joints to eliminate binding.

**IDENTIFICATION TAGS**

The identification tag for each valve control shall be recessed in the face of the tee handle.

All discharge outlets shall have color coded identification tags, with each discharge having its own unique color. Color coding shall include the labeling of the outlet and the drain for each corresponding discharge.

All line pressure gauges shall be mounted directly above the corresponding discharge control tee handles and recessed within the same chrome plated casting as the rod guide for quick identification. The gauge and rod guide casting shall be removable from the face of the pump panel for ease of maintenance. The casting shall be color coded to correspond with the discharge identification tag.

All remaining identification tags shall be mounted on the pump panel in chrome plated bezels.

The pump panel on the right (passenger's) side shall be removable with lift and turn type fasteners.

Trim rings shall be installed around all inlets and outlets.

The trim rings for the side discharge outlets shall be color coded and labeled to correspond with the discharge identification tag.

**PUMP PANEL CONFIGURATION**

The pump panel configuration shall be arranged and installed in an organized manner that shall provide user-friendly operation.

**PUMP OPERATOR'S PLATFORM**

A pull out, flip down platform shall be provided at the pump operator's control panel.
The front edge and the top surface of the platform shall be made of DA finished aluminum with a Morton Cass insert.

The platform shall be approximately 13.75" deep when in the stowed position and approximately 22.00" deep when extended. The platform shall be 35.00" wide. The platform shall lock in the retracted and the extended position.

The platform shall be wired to the "step not stowed" indicator in the cab.

**PUMP OPERATOR'S PLATFORM PERIMETER LIGHT**
There shall be an On Scene Solutions, Model Night Stick Access, 20.00" white 12 volt DC LED strip light provided to illuminate the ground area.

**PUMP AND GAUGE PANEL**
The pump and gauge panels shall be constructed of aluminum with a black vinyl finish. A polished aluminum trim molding shall be provided around each panel.

The passenger's side pump panel shall be vertically hinged and fastened with lift and turn fasteners. The driver's side operators pump panel shall be secured using screws. The upper driver's side gauge panel shall be horizontally hinged and fastened with lift and turn latches.

**PUMP COMPARTMENT LIGHT**
There shall be one (1) Whelen®, Model 3SC0CDCR, 3.00" white 12 volt DC LED light(s) with Whelen, Model 3FLANGEC, flange(s) installed in the pump compartment.

There shall be a switch accessible through a door on the pump panel included with this installation.

Engine monitoring graduated LED indicators shall be incorporated with the pressure controller.

Also provided at the pump panel shall be the following:

- Master Pump Drain Control

**AIR HORN BUTTON**
An air horn control button shall be provided at the pump operator's control panel. This button shall be red in color and properly labeled and put within easy reach of the operator.

**VACUUM AND PRESSURE GAUGES**
The pump vacuum and pressure gauges shall be liquid filled and manufactured by Class 1 Incorporated ©.
The gauges shall be a minimum of 4.00" in diameter and shall have white faces with black lettering, with a pressure range of 30.00"-0-600#.

Gauge construction shall include a Zytel nylon case with adhesive mounting gasket and threaded retaining nut.

The pump pressure and vacuum gauges shall be installed adjacent to each other at the pump operator's control panel.

Test port connections shall be provided at the pump operator's panel. One (1) shall be connected to the intake side of the pump, and the other to the discharge manifold of the pump. They shall have 0.25 in. standard pipe thread connections and non-corrosive polished stainless steel or brass plugs. They shall be marked with a label.

This gauge shall include a 10 year warranty against leakage, pointer defect, and defective bourdon tube.

PRESSURE GAUGES
The individual "line" pressure gauges for the discharges shall be interlube filled and manufactured by Class 1©.

They shall be a minimum of 2.00" in diameter and shall have white faces with black lettering.

Gauge construction shall include a Zytel nylon case with adhesive mounting gasket and threaded retaining nut.

Gauges shall have a pressure range of 30"-0-400#.

The individual pressure gauge shall be installed as close to the outlet control as practical.

This gauge shall include a 10 year warranty against leakage, pointer defect, and defective bourdon tube.

WATER LEVEL GAUGE
An electric water level gauge shall be incorporated in the pressure controller that registers water level by means of 9 LEDs. They shall be at 1/8 level increments with a tank empty LED. The LEDs shall be a bright type that is readable in sunlight, and have a full 180-degree of clear viewing.

To further alert the pump operator, the gauge shall have a warning flash when the tank volume is less than 25%, and shall have "Down Chasing LEDs when the tank is almost empty."
The level measurement shall be ascertained by sensing the head pressure of the fluid in the tank or cell.

**WATER LEVEL GAUGE, CAB SIDES**
A water level gauge system shall be provided at one each side of the rear cab side, below the scene light. Each system shall be provided with four (4) Whelen, vertical mounted LED lights with flanges. The total quantity of the water level gauge systems to be provided shall be two (2).

The following lights shall be mounted and indicate the following:

- **Model 50G00FGR top light with green LED light with clear lens.**
  - water tank level full.

- **Model 50B00FBR second light with blue LED lights with clear lens.**
  - water tank level 3/4 full.

- **Model 50A00FAR third light with amber LED lights with clear lens.**
  - water tank level 1/2 full.

- **Model 50R00FRR bottom light with red LED lights with clear lens.**
  - water tank level 1/4 full when on solid and shall flash when empty.

The above system shall function similar to the standard five (5) light at the pump panel. The system shall activate when the parking brake is set.

**STEP/LIGHT SHIELD**
There shall be an aluminum treadplate stepping surface no less than 8.00" deep and properly reinforced to support a man's weight, installed over the pump operators panel.

- There shall be 12 volt DC white LED lights installed under the step to illuminate the controls, switches, essential instructions, gauges, and instruments necessary for the operation of the apparatus. These lights shall be activated by the pump panel light switch. Additional lights shall be included every 18.00" depending on the size of the pump house.

- One (1) pump panel light shall come on when the pump is in ok to pump mode.

There shall be a light activated above the pump panel light switch when the parking brake is set. This is to afford the operator some illumination when first approaching the control panel.
There shall be a green pump engaged indicator light activated on at the operator's panel when the pump is shifted into gear from inside the cab.

There shall be one (1) white LED, step light provided above this step. In order to ensure exceptional illumination, each step light shall provide a minimum of 25 foot-candles (fc) covering an entire 15.00" x 15.00" square placed 10.00" below the light and a minimum of 1.5 fc covering an entire 30.00" x 30.00" square at the same 10.00" distance below the light. The step light shall be activated by the pump panel light switch.

**MICROPHONE & SPEAKER COMPARTMENT**
A microphone and speaker compartment with a louvered polished stainless steel door shall be furnished adjacent to the pump operator's panel. Compartment size shall be 10 by 10 by 6" deep.

**AIR HORN SYSTEM**
There shall be two (2) Grover, air horns provided and located in the front bumper, recessed to the outside of the frames. The horn system shall be piped to the air brake system wet tank utilizing 0.38" tubing. A pressure protection valve shall be installed in-line to prevent loss of air in the air brake system.

**AIR HORN CONTROL**
Two (2) plastic covered chain lanyard pull controls shall be provided, one (1) within reach of the driver and one (1) within reach of the officer.

**ELECTRONIC SIREN**
A Federal, model 690010, PA300-012MSC, electronic siren with noise canceling microphone shall be provided.

This siren to be active when the battery switch is on and that emergency master switch is on.

Electronic siren head shall be recessed in the overhead console above the engine tunnel on the driver side.

The electronic siren shall be controlled on the siren head only. No horn button or foot switches shall be required.

**SPEAKER**
There shall be one (1) speaker provided. Speaker shall be a Federal Signal DynaMax®, Model ES100C, 100 watt. Speaker shall use a Federal Signal, Model ESFMT, recess mount with polished trim ring. Speaker shall be connected to the siren amplifier.

The speaker shall be recessed in the front bumper on the driver's side.
MECHANICAL SIREN
There shall be one (1) Federal, Model Q2B, mechanical siren furnished. A siren brake button shall be installed on the switch panel on driver side and officer side.

The control solenoid shall be powered up after the emergency master switch is activated and shall be interlocked to the parking brake so that the siren cannot be accidentally activated when the parking brake is applied.

The mechanical siren shall be mounted on the bumper deck plate. It shall be mounted on the left side. The siren mounting shall include a reinforcement plate.

The mechanical siren shall be actuated by two (2) foot switches, one (1) located on the officer's side and one (1) on the driver's side.

FRONT ZONE UPPER WARNING LIGHTS
There shall be two (2) 21.50" Whelen Freedom IV LED lightbars mounted on the cab roof, one (1) on each side, above the driver's and passenger's door, facing forward.

The driver's side lightbar shall include the following:

- One (1) red flashing LED module in the outside end position.
- One (1) red flashing LED module in the outside front corner position.
- One (1) red flashing LED module in the outside front position.
- One (1) red flashing LED module in the inside front position.
- One (1) red flashing LED module in the inside front corner position.

The passenger's side lightbar shall include the following:

- One (1) red flashing LED module in the inside front corner position.
- One (1) red flashing LED module in the inside front position.
- One (1) red flashing LED module in the outside front position.
- One (1) red flashing LED module in the outside front corner position.
- One (1) red flashing LED module in the outside end position.

There shall be clear lenses.

There shall be a switch in the cab on the switch panel to control the lightbars.

CAB FACE WARNING LIGHTS
There shall be four (4) Whelen®, Model M6*C, LED flashing warning lights installed on the cab face, above the headlights, mounted in a common bezel.
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- The driver's side front outside warning light to be red
- The driver's side front inside warning light to be red
- The passenger's side front inside warning light to be red
- The passenger's side front outside warning light to be red

All four (4) lights shall include a clear lens.

There shall be a switch located in the cab, on the switch panel, to control the four (4) lights.

The inside lights may be load managed if colored or disabled if white, when the parking brake is set.

**HEADLIGHT FLASHER**

The high beam headlights shall flash alternately between the left and right side.

There shall be a switch installed in the cab on the switch panel to control the high beam flash. This switch shall be live when the battery switch and the emergency master switches are on.

The flashing shall automatically cancel when the hi-beam headlight switch is activated or when the parking brake is set.

**SIDE ZONE LOWER LIGHTING**

There shall be six (6) Whelen®, Model M6*C, LED flashing warning lights with Model 6EFLANGE, chrome flanges located in the following positions:

- Two (2) lights, one (1) each side on the bumper extension
  - The side front lights to be red
- Two (2) lights, one (1) each side above the front wheels
  - The side middle lights to be red
- Two (2) lights, included with the rear stabilizer lights
  - The side rear lights to be red

All six (6) lights shall include a clear lens.

There shall be a switch located in the cab on the switch panel to control the lights.

**REAR ZONE LOWER LIGHTING**

There shall be two (2) Whelen®, Model M6*C LED flashing warning lights with Model M6FC, chrome flanges located at the rear of the apparatus.

- The driver's side rear light to be red
- The passenger's side rear light to be red
Both lights shall include a lens that is clear.

There shall be a switch located in the cab on the switch panel to control the lights.

**REAR/SIDE ZONE UPPER WARNING LIGHTS**
There shall be two (2) Whelen®, Model L31H*FN, LED warning beacons provided at the rear of the truck, located one (1) each side. There shall be a switch located in the cab on the switch panel to control the beacons.

The color of the lights shall be red LEDs with both domes clear.

**TRAFFIC DIRECTING LIGHT**
There shall be one (1) Whelen®, Model TAL65, 36.01” long x 2.84” high x 2.24” deep, amber LED traffic directing light installed at the rear of the apparatus.

The Whelen, Model TACTLD1, control head shall be included with this installation.

The auxiliary warning mode shall be activated with the control head only.

This traffic directing light shall be mounted on top of the body below the turntable at the rear of the apparatus.

The traffic directing light control head shall be located in the driver side overhead switch panel in the right panel position.

**ELECTRICAL SYSTEM GENERAL DESIGN FOR ALTERNATING CURRENT**
The following guidelines shall apply to the 120/240 VAC system installation:

**General**
Any fixed line voltage power source producing alternating current (ac) line voltage shall produce electric power at 60 cycles plus or minus 3 cycles.

Except where superseded by the requirements of NFPA 1901, all components, equipment and installation procedures shall conform to NFPA 70, National Electrical Code (herein referred to as the NEC).

Line voltage electrical system equipment and materials included on the apparatus shall be listed and installed in accordance with the manufacturer's instructions. All products shall be used only in the manner for which they have been listed.
Grounding

Grounding shall be in accordance with Section 250-6 "Portable and Vehicle Mounted Generators" of the NEC. Ungrounded systems shall not be used. Only stranded or braided copper conductors shall be used for grounding and bonding.

An equipment grounding means shall be provided in accordance with Section 250-91 (Grounding Conductor Material) of the NEC.

The grounded current carrying conductor (neutral) shall be insulated from the equipment grounding conductors and from the equipment enclosures and other grounded parts. The neutral conductor shall be colored white or gray in accordance with Section 200-6 (Means of Identifying Grounding Conductors) of the NEC.

In addition to the bonding required for the low voltage return current, each body and driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor. This conductor shall have a minimum amperage rating of 115 percent of the nameplate current rating of the power source specification label as defined in Section 310-15 (amp capacities) of the NEC. A single conductor properly sized to meet the low voltage and line voltage requirements shall be permitted to be used.

All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.

Operation

Instructions that provide the operator with the essential power source operating instructions, including the power-up and power-down sequence, shall be permanently attached to the apparatus at any point where such operations can take place.

Provisions shall be made for quickly and easily placing the power source into operation. The control shall be marked to indicate when it is correctly positioned for power source operation. Any control device used in the drive train shall be equipped with a means to prevent the unintentional movement of the control device from its set position.

A power source specification label shall be permanently attached to the apparatus near the operator's control station. The label shall provide the operator with the information detailed in Figure 19-4.10.

Direct drive (PTO) and portable generator installations shall comply with Article 445 (Generators) of the NEC.
**Overcurrent protection**

The conductors used in the power supply assembly between the output terminals of the power source and the main over current protection device shall not exceed 144.00" (3658 mm) in length.

For fixed power supplies, all conductors in the power supply assembly shall be type THHW, THW, or use stranded conductors enclosed in nonmetallic liquid tight flexible conduit rated for a minimum of 194 degree Fahrenheit (90 degrees Celsius).

For portable power supplies, conductors located between the power source and the line side of the main overcurrent protection device shall be type SO or type SEO with suffix WA flexible cord rated for 600-volts at 194 degrees Fahrenheit (90 degrees Celsius).

**Wiring Methods**

Fixed wiring systems shall be limited to the following:

- Metallic or nonmetallic liquid tight flexible conduit rated at not less than 194 degrees Fahrenheit (90 degrees Celsius)
- or
- Type SO or Type SEO cord with a WA suffix, rated at 600 volts at not less than 194 degrees Fahrenheit (90 degrees Celsius)

Electrical cord or conduit shall not be attached to chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components, or low voltage wiring. In addition the wiring shall be run as follows.

- Separated by a minimum of 12.00" (305 mm), or properly shielded, from exhaust piping
- Separated from fuel lines by a minimum of 6.00" (152 mm) distance

Electrical cord or conduit shall be supported within 6.00" (152 mm) of any junction box and at a minimum of every 24.00" (610 mm) of continuous run. Supports shall be made of nonmetallic materials or corrosion protected metal. All supports shall be of a design that does not cut or abrade the conduit or cable and shall be mechanically fastened to the vehicle.

**Wiring Identification**

All line voltage conductors located in the main panel board shall be individually and permanently identified. The identification shall reference the wiring schematic or indicate the final termination point. When prewiring for future power sources or devices, the unterminated ends shall be labeled showing function and wire size.
Wet Locations
All wet location receptacle outlets and inlet devices, including those on hardwired remote power distribution boxes, shall be of the grounding type provided with a wet location cover and installed in accordance with Section 210-7 "Receptacles and Cord Connections" of the NEC.

All receptacles located in a wet location shall be not less than 24.00" (610 mm) from the ground. Receptacles on off-road vehicles shall be a minimum of 30.00" (762 mm) from the ground.

The face of any wet location receptacle shall be installed in a plane from vertical to not more than 45 degrees off vertical. No receptacle shall be installed in a face up position.

Dry Locations
All receptacles located in a dry location shall be of the grounding type. Receptacles shall be not less than 30.00" (762 mm) above the interior floor height.

All receptacles shall be marked with the type of line voltage (120-volts or 240-volts) and the current rating in amps. If the receptacles are direct current, or other than single phase, they shall be so marked.

Listing
All receptacles and electrical inlet devices shall be listed to UL 498, Standard for Safety Attachment Plugs and Receptacles, or other appropriate performance standards. Receptacles used for direct current voltages shall be rated for the appropriate service.

Electrical System Testing
The wiring and associated equipment shall be tested by the apparatus manufacturer or the installer of the line voltage system.

The wiring and permanently connected devices and equipment shall be subjected to a dielectric voltage withstand test of 900-volts for one (1) minute. The test shall be conducted between live parts and the neutral conductor, and between live parts and the vehicle frame with any switches in the circuit(s) closed. This test shall be conducted after all body work has been completed.

Electrical polarity verification shall be made of all permanently wired equipment and receptacles to determine that connections have been properly made.

Operational Test per Current NFPA 1901 Standard
The apparatus manufacturer shall perform the following operation test and ensure that the power source and any devices that are attached to the line voltage electrical system are properly connected and in working order. The test shall be witnessed and the results certified by an independent third-party certification organization.
The prime mover shall be started from a cold start condition and the line voltage electrical system loaded to 100 percent of the nameplate rating.

The power source shall be operated at 100 percent of its nameplate voltage for a minimum of two (2) hours unless the system meets category certification as defined in the current NFPA 1901 standard.

Where the line voltage power is derived from the vehicle's low voltage system, the minimum continuous electrical load as defined in the current NFPA 1901 standard shall be applied to the low voltage electrical system during the operational test.

**GENERATOR**

The apparatus shall be equipped with a complete electrical power system. The generator shall be a Harrison Model MCR Stealth 6.0 kW Hydraulic unit. The wiring and generator installation shall conform to the present National Electrical Codes Standards of the National Fire Protection Association. The installation shall be designed for continuous operation without overheating and undue stress on components.

**Generator Performance**

- Nominal Rating: 6,000 watts
- Continuous Duty Rating: 6,000 watts
- Nominal Volts: 120/240
- Amperage: 50 @ 120volts, 25 @ 240 volts
- Phase: Single
- Cycles: 60 hertz
- Engine Speed at Engagement: Idle

The generator shall be driven by a transmission power take off unit, through a hydraulic pump and motor.

The generator shall include an electrical control inside the cab. The hydraulic engagement supply shall be operational at any time (no interlocks).

An electric/hydraulic valve shall supply hydraulic fluid to the clutch engagement unit provided on the chassis PTO drive.
The generator hydraulic circuit shall include a soft start valve to protect the generator components during PTO engagement.

**Generator Instruments and Controls**

To properly monitor the generator performance a digital meter panel shall be furnished and mounted next to the circuit breaker panel. The meter shall indicate the following items:

- Voltage
- Amperage for both lines
- Frequency
- Generator run hours
- Over current indication
- Over temperature indication
- "Power On" indication
- Two (2) fuse holders with two (2) amp fuses (for indicator light protection)

The gauges and controls shall be installed near eye level in the compartment. Instruments shall be flush mounted in an appropriate sized weatherproof electrical enclosure. All instruments used shall be accurate within +/- two (2) percent. The load center shall have a circuit breaker to assure overload protection. The breaker furnished shall be properly sized to the generator output.

**Generator Wiring**

The system shall be installed by highly qualified electrical technicians to assure the required level of safety and protection to the fire apparatus operators. The wiring, electrical fixtures and components shall be to the highest industry quality standards available on the domestic market. The equipment shall be the type as designed for mobile type installations subject to vibration, moisture and severe continuous usage. The following electrical components shall be the minimum acceptable quality standards for this apparatus:

**Wiring:**

All electrical wiring shall be fine stranded copper type. The wire shall be sized to the load and circuit breaker rating; ten (10) gauge on 30 amp circuits, 12 gauge on 20 amp circuits and 14
gauge on 15 amp circuits. The cable shall be run in corner areas and extruded aluminum pathways built into the body for easy access.

Load Center:

The main load center shall be Cutler-Hammer with circuit breakers rated to load demand.

Circuit Breakers:

Individual breakers shall be provided for all on-line equipment to isolate a tripped breaker from affecting any other on-line equipment.

**GENERATOR LOCATION**

The generator shall be mounted in the area over the pump on the right side. The flooring in this area shall be either reinforced or constructed in such a manner that it shall handle the additional weight of the generator.

**GENERATOR START**

There shall be a switch provided on the cab instrument panel to engage the generator.

**CIRCUIT BREAKER PANEL**

The circuit breaker panel shall be located in the compartment above the driver's side front stabilizer.

**120 VOLT LIGHTING**

There shall be Two (2) Whelen®, Model PCP2AP1*, 120 volt AC LED light(s) with a switch on the light head and Model PBAPEDA, pedestal mounting bracket(s) installed aerial tep.

The painted parts of this light assembly to be white.

The light(s) selected above shall be controlled by the circuit breaker(s) located in the breaker panel as well as the following:

- a switch at the driver's side switch panel
- a switch at the driver's side pump panel
- a cup switch at the driver's side back of cab
- a switch at the aerial turntable control pedestal

**120 VOLT RECEPTACLE**

There shall be three (3), 15 amp 120 volt AC three (3) wire twist lock receptacle(s) with waterproof flip up cover(s) installed on drivers side, passenger side above rear wheels and 1 on
rear driver side bulkhead next to door. The NEMA configuration for the receptacles shall be L5-15R.

The receptacle(s) shall be powered from the generator.

There shall be a label installed near the receptacle(s) that state the following:

- Line Voltage
- Current Rating (amps)
- Phase
- Frequency
- Power Source

FOUR (4)-SECTION 107 FOOT AERIAL LADDER

CONSTRUCTION STANDARDS
The ladder shall be constructed to meet all of the requirements as described in the current NFPA 1901 standards.

The aerial device shall be a true ladder type device; therefore ladders attached to booms shall not be considered.

These capabilities shall be established in an unsupported configuration.

All structural load supporting elements of the aerial device that are made of a ductile material shall have a design stress of not more than 50% of the minimum yield strength of the material based on the combination of the live load and the dead load. This 2:1 structural safety factor meets the current NFPA 1901 standard.

All structural load supporting elements of the aerial device that are made of non-ductile material shall have a design stress of not more than 20% of the minimum ultimate strength of the material, based on the combination of the rated capacity and the dead load. This 5:1 safety factor meets the current 1901 NFPA standard.

Wire ropes and attaching systems used to extend and retract the fly sections shall have a 5:1 safety factor based on the ultimate strength under all operating conditions. The factor of safety for the wire rope shall remain above 2:1 during any extension or retraction stall. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1:12. Wire ropes shall be constructed of seven (7) strands over an inner wire core for increased flexibility. The wire rope shall be galvanized to reduce corrosion.
The aerial base pivot bearings shall be maintenance free type bearings and require no external lubrication.

The aerial device shall be capable of sustaining a static load one and one-half times its rated tip load capacity (live load) in every position in which the aerial device can be placed when the vehicle is on a firm level surface.

The aerial device shall be capable of sustaining a static load one and one-third times its rated tip load capacity (live load) in every position the aerial device can be placed when the vehicle is on a slope of five degrees downward in the direction most likely to cause overturning.

With the aerial device out of the cradle and in the fully extended position at zero degrees elevation, a test load shall be applied in a horizontal direction normal to the centerline of the ladder. The turntable shall not rotate and the ladder shall not deflect beyond what the product specification allows.

All welding of aerial components, including the aerial ladder sections, turntable, pedestal, and outriggers, shall be in compliance with the American Welding Society standards. All welding personnel shall be certified, as qualified under AWS welding codes.

The aerial device shall be capable of operating with the maximum rated tip load in either of the two (2) following conditions:

- Conditions of high wind up to 35 mph
- Conditions of icing, up to a coating of .25" over the entire aerial structure

All of the design criteria must be supported by the following test data (no exception):

- Strain gage testing of the complete aerial device
- Analysis of deflection data taken while the aerial device was under test load

The following standards for materials are to be used in the design of the aerial device:

- Materials are to be certified by the mill that manufactured the material
- Materials that are certified or recertified by vendors other than the mill shall not be acceptable
- Material testing that is performed after the mill test shall be for verification only and not with the intent of changing the classification
- All welded structural components for the ladder shall be traceable to their mill lots
LADDER CONSTRUCTION

The ladder shall be comprised of four sections.

The ladder shall have the capability to support a minimum of 750 pounds at the tip in the unsupported configuration, based upon 360 degree rotation, up to full extension and from -10 degrees to +77 degrees.

The ladder (handrails, baserails, trusses, K-braces and rungs) shall be constructed of high strength low alloy steel, minimum 100,000 pounds per square inch yield, with full traceability on all structural members (no exception).

Each section shall be trussed diagonally, vertically and horizontally using welded steel tubing.

All ladder rungs shall be round and welded to each section utilizing "K" bracing for torsional rigidity.

The inside width dimensions of the ladder shall be:

- Base Section 41.87"
- Inner-Mid Section 34.88"
- Outer-Mid Section 27.87"
- Fly Section 21.63"

The height of the handrails above the centerline of the rungs shall be:

- Base Section 25.69"
- Inner-Mid Section 22.06"
- Outer-Mid Section 19.44"
- Fly Section 16.70"

The ladder shall be designed to provide continuous egress for firefighters and civilians from an elevated position to the ground. The end of the fly section shall be constructed in a manner that aids personnel in climbing off the ladder.

The egress section shall be designed to maintain the rated load of the aerial device. It shall be bolted on for easy replacement. There shall be a tow eye welded on to each side of the egress.
VERTICAL HEIGHT
The ladder shall extend to a minimum height of 107' above the ground at full extension and elevation. The measurement of height shall be consistent with NFPA standards.

HORIZONTAL REACH
The rated horizontal reach shall be a minimum of 100' (no exception). The measurement of horizontal reach shall be consistent with NFPA standards.

TURNTABLE
The upper turntable assembly shall connect the aerial ladder to the turntable bearing. The steel structure shall have a mounting position for the aerial elevation cylinders, ladder connecting pins, and upper turntable operator's position.

The turntable shall be a .375" thick aluminum plate, coated with a non-skid, chemical resistant material in the walking areas. The stepping surfaces shall meet the skid-resistance requirements of the current NFPA 1901 standard.

The turntable shall be modified at the passenger side to allow for easier access to the hose bed for hose loading. The portion of the turntable outboard of the rotational motor shall be omitted, and the handrails shall be modified as required.

The turntable shall be lit to meet the current edition of NFPA 1901 requirements. Lights shall be activated by the aerial master switch.

The turntable handrails shall be a minimum 42.00" high and shall not increase the overall travel height of the vehicle. The handrails shall be constructed from aluminum and have a slip resistant knurled surface.

ELEVATION SYSTEM
Dual 5.50" diameter elevating cylinders shall be mounted on the underside of the base section of the ladder. Two (2) 2.25" diameter stainless steel pins shall fasten the cylinder to the turntable and fasten to the ladder. The pins shall have 125,000 psi minimum yield strength and shall be secured with .50" Grade 8 bolts with castle nut and cotter pin. The bolts are to ensure that the pins do not walk out of the mounting brackets on the turntable and base section.

The elevating cylinders shall be mounted utilizing maintenance-free spherical bearings on both ends of the cylinders (no exception). The aerial base pivot bearings shall be maintenance-free type bearings with no external lubrication required (no exception). The cylinders shall function only to elevate the ladder and not as a structural member to stabilize the ladder side movement.

The elevating cylinders shall be provided with pilot-operated check valves on the barrel and rod side of the piston to prevent movement of the ladder in case of a loss of hydraulic pressure.
The operation envelope shall be 10 degrees below horizontal to 77 degrees above horizontal.

The elevation system shall be designed following NFPA standards. The elevation hydraulic cylinders shall incorporate cushions on the upper limit of travel.

The lift cylinders shall be equipped with integral holding valves located in the cylinder to prevent the unit from descending should the charged lines be severed, at any point within the hydraulic system and to maintain the ladder in the bedded position during road travel. The integral holding valves shall NOT be located in the transfer tubes.

The elevation system shall be controlled by the microprocessor. Linear transducers shall measure the extension of the elevation cylinder. The microprocessor shall provide the following features:

- Collision avoidance of the elevation system to prevent accidental body damage
- Automatic deceleration when the aerial device is lowered into the cradle
- Automatic deceleration at the end of stroke, in maximum raise and lower positions
- Deceleration of the aerial device at the limits of travel.

**EXTENSION/RETRACTION SYSTEM**

A hydraulically powered, extension and retraction system shall be provided through dual hydraulic cylinders and wire ropes. Each set shall be capable of operating the ladder in the event of a failure, of the other. For safety, systems that use only a single extension/retraction system shall not be acceptable. The extension cylinder rod shall be chrome plated to provide smooth operation of the aerial device and reduce seal wear. The extension/retraction cylinders shall be equipped, with integral holding valves, to prevent the unit from retracting should the charged line be severed, at any point within the hydraulic system. The integral holding valves shall NOT be located in the transfer tubes.

Wire ropes and attaching systems used to extend and retract the fly sections shall have a 5:1 safety factor based on the ultimate strength under all operating conditions. The factor of safety for the wire rope shall remain above 2:1 during any extension or retraction stall. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1:12. Wire ropes shall be constructed of seven (7) strands over an inner wire for increased flexibility. The wire rope shall be galvanized to reduce corrosion.

The extension/retraction system shall be controlled by the microprocessor. Linear transducers shall measure the ladder extension. The microprocessor shall provide the following features:
- Automatic deceleration at the end of stroke, in maximum extend and retract positions

All sheaves shall be greaseless and all sheave pins and pivot pins shall be polished stainless steel (no exception).

**MANUAL OVERRIDE CONTROLS**
Manual override controls shall be provided for all aerial and stabilizer functions.

**LADDER SLIDE MECHANISM**
UHMW polyethylene wear pads shall be used between the telescoping ladder sections, to provide greater bearing surface area for load transfer. Adjustable slide pads shall be used to control side play between the ladder sections.

**ROTATION SYSTEM**
The aerial shall be supplied with a powered rotation system as outlined in NFPA standards. The hydraulic rotation motor shall provide continuous rotation under all rated conditions and be supplied with a brake to prevent unintentional rotation. One (1) hydraulically driven, planetary gear box with drive speed reducers shall be used to provide infinite and minute rotation control throughout the entire rotational travel. One (1) spring applied, hydraulically released disc type swing brake shall be furnished to provide positive braking of the turntable assembly. Provisions shall be made for emergency operation of the rotation system should complete loss of normal hydraulic power occur. The hydraulic system shall be equipped with pressure relief valves which shall limit the rotational torque to a nondestructive power. The gearbox shall have a minimum continuous torque rating of 80,000 in. lbs. and a minimum intermittent rating of 160,000 in. lbs. The turntable bearing, ring gear teeth, pinion gear, planetary gearbox, and output shaft shall be certified by the manufacturer of the components for the application.

The rotation system shall be controlled by the microprocessor. The microprocessor shall provide the following features:

- Collision avoidance to prevent accidental body damage

- Prevent the aerial from being rotated into an unstable condition.

**ROTATION INTERLOCK**
The microprocessor shall be used to prevent the rotation of the aerial device to the side in which the stabilizers have not been fully deployed (short-jacked). The microprocessor shall allow full and unrestricted use of the aerial, in the 180 degree area, on the side(s) where the stabilizers have been fully deployed. The system shall also have a manual override, to comply with NFPA 1901. SYSTEMS THAT PERMIT THE AERIAL TO ROTATE TO THE "SHORT JACK" SIDE, WITHOUT AUTOMATICALLY STOPPING THE ROTATION AND/OR WITHOUT
ACTUATION OF THE "MANUAL OVERRIDE", SHALL NOT BE ACCEPTED. SYSTEMS THAT ONLY INCLUDE AN ALARM ARE NOT CONSIDERED AN INTERLOCK AND SHALL NOT BE ACCEPTED.

LADDER CRADLE INTERLOCK SYSTEM
A ladder cradle interlock system shall be provided through the microprocessor to prevent the lifting of the aerial device from the nested position until the operator places all the stabilizers in a load supporting configuration. A switch shall be installed at the boom support to prevent operation of the stabilizers once the aerial has been elevated from the nested position.

AERIAL TORQUE BOX/PEDESTAL
The pedestal assembly shall be a welded assembly made of high strength 0.25" plate. The vertical member shall be a .375" reinforced wall cylinder with a 28" outside diameter and shall connect the rotation bearing mounting plate to the lower substructure.

The pedestal assembly shall be bolted to the chassis frame with .88" diameter Grade 8 bolts, and shall be utilized to mount the outrigger jacks and reservoir for the aerial hydraulic system.

LOAD CAPACITIES
The following load capacities shall be established, with the stabilizers at full horizontal extension and placed in the down position, to level the truck and to relieve the weight from the tires and axles.

Capacities shall be based upon full 360 degree rotation with ladder extended to operational limits at 0 degrees elevation.

A load chart, visible at the operator's station shall be provided. The load chart shall show the recommended safe load at any condition of the aerial device's elevation and extension (no exception).

35 MPH WIND CONDITIONS/WATERWAY DRY

<table>
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<th>Degrees of Elevation</th>
<th>-10 to 9</th>
<th>10 to 19</th>
<th>20 to 29</th>
<th>30 to 39</th>
<th>40 to 49</th>
<th>50 to 59</th>
<th>60 to 69</th>
<th>70 to 77</th>
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<tbody>
<tr>
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</tr>
</tbody>
</table>
Reduced loads at the tip can be redistributed in 250 lb. increments to the fly, mid, or base sections as needed.

The tip capacity shall be reduced to zero when flowing water with the nozzle above the waterway centerline.

BOOM SUPPORT
A heavy duty boom support shall be provided for support of the ladder in the travel position. On the base section of the ladder, a stainless steel scuffplate shall be provided where the ladder comes into contact with the boom support.

The boom support shall be located just to the rear of the chassis cab.

AERIAL BOOM PANEL
There shall be one boom panel provided on each side of the aerial ladder base section. The boom panel shall be painted white.

The boom panels shall be designed so no mounting bolts are in the face of the panel. This shall keep the lettering surface free of holes.

EXTENSION INDICATOR
Extension markings and corresponding numerical indicators shall be provided along each inside and outside top rail of the base section of the aerial every 10’. They shall indicate various positions of extension up to full. Markings and indicators shall be clearly visible to the console operator. To aid in visibility during hours of darkness, the markings and numerical indicators shall be of a red reflective material.

FOLDING STEPS
One (1) set of folding steps shall be provided at the tip of the ladder. An additional set of folding steps shall be provided at the base of the fly section. The steps shall be bright finished, non-skid with a black coating.
AERIAL DEVICE RUNG COVERS
Each rung shall be covered with a secure, heavy-duty, fiberglass pultrusion that incorporates an aggressive, no-slip coating.

The rung covers shall be glued to each rung, and shall be easily replaceable should the rung cover become damaged.

The center portion of each rung cover shall be black and the outside 2.00" edge at each side shall be safety yellow.

Under no circumstances shall the rung covers be fastened to the rungs using screws or rivets (no exception).

The rung covers shall have a 10-year, limited warranty.

STOKES STORAGE BRACKETS
There shall be one (1) aluminum bracket(s) provided at the base section of the aerial ladder on the right side of the aerial device while viewed from the turntable. The brackets shall be located inboard of the aerial boom panel. The brackets shall be D/A finished and include locking pins to secure the basket.

INFORMATION CENTER
There shall be an information center provided. The information center shall operate in temperatures from -40 to 185 degrees Fahrenheit. The information center shall employ a Linux operating system and a 7.00" (diagonal measurement) LCD display. The LCD shall have a minimum 1000nits rated, color display. The LCD shall be sunlight readable, true digital operation, and shall have improved resolution. The LCD display shall be encased in an ABS, grey plastic housing with a gray decal. There shall be five (5), weather-resistant user interface switches provided. The LCD display can be changed to an available foreign language.

OPERATION
The information center shall be designed for easy operation in everyday use. There shall be a page button to cycle from one screen to the next screen in a rotating fashion. A video button shall allow an NTSC signal into the information center to be displayed on the LCD. If any button is pressed while viewing a video feed, the information center shall return to the vehicle information screens. There shall be a menu button to provide access to maintenance, setup, and diagnostic screens. All other button labels shall be specific to the information being viewed.

GENERAL SCREEN DESIGN
Where possible, background colors shall be used to provide vehicle information At A Glance. If the information provided on a screen is within acceptable limits, a black background color shall
be used. If the information provided on a screen is not within acceptable limits, an amber background color shall indicate a caution condition and a red background color shall indicate a warning condition.

Every screen in the information center shall include the time (12- or 24-hour mode) and a fault alert triangle symbol. The time shall be synchronized between all information screen color displays located on the vehicle. Once the fault alert triangle is selected, a text message shall identify any items causing the audible alarm to sound. If more than one (1) audible alarm is activated, the text message for each alarm shall cycle every second until the problems have been resolved. The background for the Alert Center shall change to indicate the severity of the warning message. Amber shall indicate a caution condition and red shall indicate a warning condition. If a warning and a caution condition occur simultaneously, the red background color shall be shown for all Alert Center messages.

A label or symbol shall be provided for each button. The label or symbol shall indicate the function for each active button for each screen. If the button is not utilized on specific screens, it shall remain black.

Symbols shall accurately depict the aerial device type the information pertains to such as rear mount ladder, rear mount platform, mid-mount ladder or mid-mount platform.

**PAGE SCREENS**

The Information center shall include the following pages:

The Aerial Main and Load Chart page shall indicate the following information:

- Rungs Aligned and Rungs Not Aligned shall be indicated with respective green or red colored ladder symbols.

- Ladder Elevation shall be indicated via a fire apparatus vehicle with ladder symbol with the degree of elevation indicated between the vehicle and ladder.

- Water Flow (if applicable) shall be indicated via a water nozzle symbol and text indicating flow / time.

- If applicable, breathing air levels shall be indicated via an air bottle symbol and text indicating the percent (%) of air remaining. A green bar graph shown inside the bottle shall indicate oxygen levels above 20%. A red bar graph shall indicate oxygen levels at or below 20%. When oxygen levels are at or below 10%, the red bar graph shall flash.
- *At A Glance* color features shall be utilized on this screen. A fault alert triangle symbol in the lower right portion of the screen shall indicate any caution faults with a yellow background. Warning type conditions shall be indicated via a red background. Conditions operating within acceptable limits shall be indicated via a green background.

The Aerial Reach and Hydraulic Systems page shall indicate the following information:

- If applicable, aerial hydraulic oil temperature shall be indicated with symbol and text.
- Aerial Hydraulic Oil Pressure shall be indicated with a symbol and text.
- The following calculations shall be indicated on a representative vehicle symbol:
  - Aerial Device Extension length
  - Aerial Device Height indicating the height of the aerial device tip from the ground
  - Aerial Device Angle indicating the angle from the vehicle which the device is at.

- *At A Glance* color features shall be utilized on this screen. A fault alert triangle symbol in the lower right portion of the screen shall indicate any caution faults with a yellow background. Warning type conditions shall be indicated via a red background. Conditions operating within acceptable limits shall be indicated via a green background.

The Level Vehicle page shall indicate the following information:

- The grade of the vehicle shall be indicated via a fire apparatus vehicle symbol with the degree of grade shown in text format. The symbol shall tilt dependent on the vehicle grade.
- The slope of the vehicle shall be indicated via a fire apparatus vehicle symbol with the degree of slope shown in text format. The symbol shall tilt dependent on the vehicle slope.
- Outriggers status shall be indicated via a colored symbol for each outrigger present. Each outrigger status shall be defined as one of the following:
  - Outrigger stowed indicated with a silver pan located close to the vehicle
  - Outrigger fully extended indicated with a fully deployed green outrigger
  - Outrigger short-jacked indicated by a yellow outrigger partially deployed
  - Outrigger not set indicated by a red outrigger that is not set on the ground
- A bedding assist alert shall indicate that the aerial device is being aligned by the Information center system as the operator lowers the aerial device into the cradle with the joystick.

- *At A Glance* color features shall be utilized on this screen. A fault alert triangle symbol in the lower right portion of the screen shall indicate any caution faults with a yellow background. Warning type conditions shall be indicated via a red background. Conditions operating within acceptable limits shall be indicated via a green background.

The aerial operation envelope page shall indicate the following:

- A top view of the aerial operating envelope
- A side view of the aerial operating envelope

**MENU SCREENS**

The following screens shall be available through the Menu button:

The View System information screen shall display aerial device hours, aerial PTO hours, ladder aligned for stowing, aerial rotation angle, total water flow (if applicable), and aerial waterway valve status (if applicable).

The Set Display Brightness screen shall allow brightness increase and decrease and include a default setting button.

The Configure Video Mode screen shall allow setting of video contrast, video color and video tint.

The Set Startup screen allows setting of the screen that shall be active at vehicle power-up.

The Set Date and Time screen has a 12- or 24-hour format, and allows setting of the time and date.

The View Active Alarms screen shows a list of all active alarms including the date and time of each alarm occurrence, and shows all alarms that are silenced.

The System Diagnostics screen allows the user to view system status for each module and its respective inputs and outputs. Viewable data shall include the module type and ID number; the module version; and module diagnostics information including input or output number, the circuit number connected to that input or output, the circuit name (item connected to the circuit), status of the input or output, and other module diagnostic information.
Aerial Calibrations screen indicates items that may be calibrated by the user and instructions to follow for proper calibration of the aerial device.

Button functions and button labels may change with each screen.

**LOWER CONTROL STATIONS**
A lower control station shall be located on each side of the rear wall of the apparatus in an easily accessible area. The controls and indication labels shall be illuminated for nighttime operation. The following items shall be furnished at the lower control station and shall be clearly identified and conveniently located for ease of operation and viewing:

- Level assist switch
- Override switch to override interlocks
- Emergency stop
- Emergency power unit switch

**AERIAL DEVICE CONTROL STATIONS**
There shall be one (1) device control station at the aerial turntable. All elevation, extension and rotation controls shall operate from both of this location. The controls shall permit the operator to regulate the speed of the aerial functions, within the safe limits, as determined by the manufacturer and NFPA standards. The controls shall be clearly marked and lighted for nighttime operation.

Each control shall be equipped, with a positive lock to hold the control in a neutral position, preventing accidental activation. In addition to the neutral lock, a console cover shall be provided at the turntable control station. The controls shall be so designed to allow the turntable control station to immediately override the tip controls, if equipped, even if the ladder is being operated by the tip controls.

**TURNTABLE CONTROL STATION**
The turntable control station shall be located on the left side of the turntable so the operator may easily observe the ladder while operating the controls.

The following items shall be installed at the turntable control station, clearly identified, lighted for nighttime operation and conveniently located for ease of operation and viewing:

- Electric controls for elevation, rotation, extension/retraction
- Intercom controls
- Tip tracking light switch
- Emergency stop switch
- Emergency power unit switch
- Operator's load chart
- Two (2) position switch for selecting aerial operational speed

**HIGH IDLE**
The high idle shall be controlled by the microprocessor. The microprocessor shall automatically adjust the engine rpm, to compensate for the amount of load placed upon the system. The system shall include a safety device that allows activation of the high idle, only when the parking brake is set and the transmission is placed in neutral.

**REMOTE AERIAL CONTROL**
A remote control shall be provided whereby all ladder movements can be controlled at the ladder tip in addition to the control console.

The three (3) ladder functions (extension, rotation, elevation) shall be controlled individually by means of spring loaded, return to center 12-volt proportional controls.

A momentary switch at the turntable control station, in conjunction with a momentary push button on the side of the ladder tip control module shall activate the controls at the ladder tip.

The turntable control console ladder controls shall override the ladder tip controls.

The remote control aerial speed shall be set in accordance with the current NFPA 1901 standards.

**STABILIZERS**
The vehicle shall come equipped with an out and down stabilization system. The system shall consist of two (2) hydraulically operated out and down style stabilizers mounted above the frame and a rear stabilizer jack that is attached directly to the center rear of the torque box.

The stabilizers shall have a maximum spread of 18' from the centerline of the footpads when fully extended. The internal tubes shall be 8.00" x 10.00" with 1/2" thick top and bottom plates and 3/8" thick sides of 130,000 psi minimum yield strength steel and shall be extended out by hydraulic cylinders. The cylinders shall have pilot-operated check valves with thermal relief. This shall insure that the beams shall be in the stowed during travel. The external tubes shall be
9-3/4" x 11-3/4" with 3/8" wall thickness. The internal jack tubes shall slide on permanently attached wear pads.

The extension cylinders shall be totally enclosed within the extension beams. The horizontal extension cylinders shall be of the trombone type to eliminate wear and potential failure of hydraulic hoses (no exception).

The stabilizers shall have a tip over safety margin of 1 1/2 times its rated load in any position the aerial device can be placed as outlined in the current edition of NFPA 1901. The aerial shall be able to sustain a 1 1/3 to 1 rated load on a 5 degree slope downward in the position most likely to cause overturning. The maximum ground slope the apparatus can be set up on is 12 percent. On the 12 percent slope, the apparatus can be leveled within a 6 percent operating range with the apparatus cab facing uphill.

The cylinders shall be supplied with dual pilot operated check valves on each stabilizer cylinder to hold the cylinder in the stowed or working position should a charged line be severed at any point in the hydraulic system. Stabilizers shall contain safety lock valves and shall require no mechanical pins to assure there shall be no "leak down" of stabilizer legs.

Each stabilizer leg shall have attached to the end of the leg a 16 gauge polished stainless steel shield. The stainless steel shield shall be a maximum 13.00" wide to allow the extension of the stabilizer between parked cars. This plate shall serve as a protective guard and a mounting surface for warning lights. The top, forward, and rear edges shall be flanged back for added strength.

The stabilizer cylinders shall be sized to maximize ground penetration. The lift cylinders shall be mounted on the end of the stabilizer tube and shall have the following dimensions:

4.00" bore
3.50" rod
23.38" stroke

The stabilizer extension cylinders shall have the following dimensions

1.75" bore
1.25" rod
64.00" stroke
The rear stabilizer shall have the following dimensions:

4.50" bore
4.00" rod
29.00" stroke

Each stabilizer that can be extended from the body shall be supplied with a red warning light as outlined in the current edition of NFPA. The stabilizers shall be connected to a warning light in the cab to warn the operator if the stabilizers are deployed. A work light shall be provided in the stabilizer body opening to illuminate the stabilizer and the ground. The light shall automatically come on with the aerial master switch.

The ground contact area for each stabilizer shall be a 12.00" diameter circular stainless steel disc without the auxiliary pads and 24.00" x 24.00" with lightweight composite material pads deployed. The ground pressure shall not exceed 75 psi when the apparatus is fully loaded and the aerial device is carrying its rated capacity in every position. This shall be accomplished with the stabilizer pads deployed, as outlined in the current edition of NFPA 1901. There shall be one (1) pad located on each side of the apparatus in front of the stabilizers.

The auxiliary jack pad for the rear stabilizer shall be integral to the stabilizer foot pad.

**STABILIZER CONTROLS**

One (1) electric solenoid valve shall control the stabilizers. The control switches shall be located one (1) each side at the rear of the apparatus so the operator may observe the stabilizers during deployment.

The stabilizer controls shall include the following:

- Leveling assist toggle switch: The outrigger control system shall incorporate a computerized self leveling system in addition to the standard outrigger controls. The operator shall have the option to manually or automatically level the truck. The computerized system shall ensure full outrigger extension, proper jack penetration, and shall level the vehicle within 1/2 a degree of level for safe operation of the aerial device.

- One (1) electric toggle switch for the engaging the emergency power unit.

- Two (2) fully extended beams green indicator lights: these lights shall be illuminated when each of the respective stabilizer beams are fully extended.
- Three (3) firm on ground green indicator lights: each light shall be illuminated when its respective stabilizer shoe is in the load supporting condition.

Each toggle switch shall activate the engine fast idle automatically.

Manual override shall be supplied for each stabilizer control valve.

A "Stabilizers Not Stowed" indicator shall be provided in the driver's compartment. It shall illuminate automatically whenever the stabilizers are not fully stowed to prevent damage to the apparatus if moved. The stabilizer system shall also be wired to the "Do Not Move Indicator Light", which shall flash whenever the apparatus parking brake is not fully engaged and the stabilizers are not fully stowed.

**ALUMINUM DOOR, STABILIZER CONTROL BOX**
Vertically hinged smooth aluminum doors shall be provided over each stabilizer control box. The doors shall be hinged inboard.

**STABILIZER PLACEMENT**
There shall be two (2) lasers provided and installed on the body, one (1) next to each stabilizer. The lasers shall be activated with the aerial master switch and shall provide a green X on the ground to show where the stabilizer pads need to be set.

There shall be two (2) cameras provided and installed on the body, one (1) directly above each stabilizer. The cameras shall be activated with a switch in the cab and shall provide a picture to specify the fully extended stabilizer position allowing the driver the ability to position the vehicle with the proper clearance for stabilizer deployment.

**INCLINOMETER**
There shall be one (1) inclinometer(s) provided per NFPA for the aerial stabilizer control stations to assist with leveling the truck.

Each inclinometer shall be a backlit Rieker Model 1023.

**POWER TAKEOFF / HYDRAULIC PUMP**
The apparatus shall be equipped with a power takeoff driven by the chassis transmission and actuated by an electric shift, located inside the cab.

The power takeoff which drives the hydraulic pump shall meet all the requirements for the aerial unit operations.

An amber indicator light shall be installed on the cab instrument panel to notify the operator that the power takeoff is engaged.
An interlock shall be provided that allows operation of the aerial power takeoff shift only after the chassis spring brake has been set and the chassis transmission has either been placed in the neutral position or drive position after the driveline has been disengaged from the rear axle.

**HYDRAULIC CYLINDERS**
All hydraulic cylinders used on the aerial device shall be produced by a manufacturer that specializes in the production of hydraulic cylinders.

Each hydraulic cylinder shall have a structural warranty of not less than five (5) years, and a seal warranty of not less than two and a half (2.5) years (no exception).

**HYDRAULIC SYSTEM**
The hydraulic system shall have a five (5)-year warranty.

The hydraulic plumbing shall consist of hydraulic rated hoses and steel tubing.

The hoses transmitting hydraulic pressure shall have abrasion resistant covers.

All hydraulic fittings and tubing shall be plated to minimize corrosion.

The fitting shall use an O-ring seal where possible to minimize hydraulic leaks.

All pressure carrying hydraulic hoses and tubes shall have a 4:1 safety rating based on burst pressure.

An interlock shall be provided that prevents activation of the hydraulic pump until the transmission is placed in neutral and the parking brake set as outlined in the current NFPA 1901 standard.

The hydraulic system shall be of a constant pressure design and incorporate features to minimize heat build up and provide smooth control of the aerial ladder.

The system shall meet the performance requirement in the current NFPA 1901 standard, which requires adequate cooling less than 2.5 hours of operations.

All hydraulic components that are non-sealing whose failure could result in the movement of the aerial shall comply with current NFPA 1901 standards and have burst strength of 4:1.

Dynamic sealing components whose failure could cause aerial movement shall have a margin of 2:1 on maximum operating pressure per the current NFPA 1901 standard.

All hydraulic hoses, tubes and connections shall have minimum burst strength of 4:1 per the current NFPA 1901 standard.
A hydraulic oil sight gauge shall be supplied at the rear of the unit for easy fluid level verification.

A chassis-mounted positive displacement piston pump for consistent pressure and rapid response shall supply hydraulic power for all aerial operations.

The positive displacement piston pump shall provide 3,150 psi.

The hydraulic pump shall be solely dedicated to aerial operations (no exception).

The hydraulic system shall consist of a 20-gallon reservoir mounted to the pedestal and plumbed to the hydraulic pump.

There shall be plumbing for a supply and return line and a tank drain on the reservoir.

The hydraulic oil reservoir shall be labeled per the current NFPA 1901 standard.

The hydraulic system shall use multi-weight, SAE grade oil. ISO grade shall be based on geographical location.

The oil shall be pre-filtered before it is installed into the reservoir.

Oil samples taken from the oil diagnostic test ports must meet or exceed the hydraulic rating of 18/16/13 per ISO 4406:1999 before delivery.

The low pressure oil filter shall be integrated with the hydraulic manifold and designed to prevent oil loss during filter change.

The system shall incorporate the following filters to provide dependable service:

- Return filter: Beta 200 at 6 micron
- Desiccant breather filter: Water capacity 13 fluid oz, 2 micron rating

The aerial hydraulic system shall be designed in such a manner that a hydraulic pump failure or line rupture shall not allow the aerial or outriggers to lose position.

Hydraulic holding valves shall be mounted directly on cylinders.

To insure reliable performance of holding valves, no hoses shall be permitted between a holding valve and cylinder.

The aerial shall incorporate the use of trombone steel tubes inside the stabilizer beams to eliminate hydraulic hose wear and leaks.
Hydraulic power to the ladder shall be transferred from the pedestal by a hydraulic swivel.

**EMERGENCY PUMP**
The hydraulic system shall be designed with an auxiliary power unit meeting the guidelines of the current NFPA 1901 standard.

The auxiliary power unit shall be a 12-volt pump connected to the chassis electrical system.

The pump shall provide operation at reduced speeds to store the aerial device and outriggers for road transportation.

Self-centering switches shall be provided at the turntable and each stabilizer control station to activate the system.

The system shall be designed to provide a minimum of 30 minutes of hydraulic power to operate functions (no exception).

**HYDRAULIC SWIVEL**
The aerial ladder shall be equipped with a six (6) port, high pressure hydraulic swivel which shall connect the hydraulic lines from the hydraulic pump and reservoir through the rotation point to the aerial control bank. The hydraulic swivel shall allow for 360 degree continuous rotation of the aerial.

**ELECTRIC SWIVEL**
The ladder shall be equipped with an electric swivel to allow 360 degrees rotation of the aerial while connecting all electrical circuits through the rotation point. A minimum of 28 collector rings shall be provided that are capable of supplying 20 amp continuous service. All collector rings shall be enclosed and protected with desiccant plugs against condensation and corrosion. No oil or silicone shall be used.

**WATER SWIVEL**
Water shall be transferred to the aerial waterway by means of a 5.00" internal diameter waterway through the swivel, permitting 360 degree continuous rotation.

**13-BIT ABSOLUTE ENCODER**
The aerial ladder shall be equipped with a 13-Bit Absolute Encoder, CAN-based, which provides 8192 counts per shaft turn for position and direction reference.

The 13-Bit Absolute Encoder shall provide a unique binary word to reference each position and direction for all 360 degrees of rotation.
If the power is interrupted for any reason, the 13-Bit Absolute Encoder shall allow power to be returned to the system without having to re-zero the settings.

The 13-Bit Absolute Encoder shall be an integral part of a micro-processor based control system.

**ELECTRICAL SYSTEM**

The aerial device shall utilize a microprocessor-based control system. The system shall consist of the following components:

**Control System Modules**

Each of the control system modules shall be configured as follows:

- Sealed to a NEMA 4X rating
- Operating range from -40 degrees F to 156 degrees F (-40 degrees C to 70 degrees C)
- Communicate using J1939 data link
- Two (2) diagnostic LED lights
  - One (1) green light that illuminates when module has power (B+) and ground
  - One (1) red light that flashes to indicate the module is capable of communicating via the data link
- Up to 16 diagnostic LEDs on each module
- Ground matrix identification system

The following control system modules shall be used:

**Control Module**

- Main controller for the system
- USB connection allows for computer diagnostics

**Power Module**

- Built-in fault sensing
- Eight (8) digital outputs
- Pulse width modulating (PWM) capable
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<table>
<thead>
<tr>
<th>10A continuous per output</th>
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<tbody>
<tr>
<td>Circuit protection based on actual current draw (not affected by heat)</td>
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<tr>
<td>Current Control Module</td>
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<tr>
<td>Built-in fault sensing</td>
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<tr>
<td>Three (3) analog inputs</td>
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<tr>
<td>Eight (8) digital outputs</td>
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<tr>
<td>Pulse width modulating (PWM) capable</td>
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<tr>
<td>3A continuous per output</td>
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<tr>
<td>Closed Loop System</td>
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<tr>
<td>Circuit protection based on actual current draw (not affected by heat)</td>
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<tr>
<td>Input Module</td>
</tr>
<tr>
<td>16 software selectable (digital or analog) inputs</td>
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<tr>
<td>Output Module</td>
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<tr>
<td>16 digital outputs</td>
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<tr>
<td>Input/Output Module</td>
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<tr>
<td>Eight (8) software selectable (digital or analog) inputs</td>
</tr>
<tr>
<td>Eight (8) digital outputs</td>
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</table>

### SPOTLIGHTS

There shall be six (6) Whelen® Micro Pioneer, Model MPB*, 12 volt DC LED bail mount lights furnished.

- One (1) shall be mounted on the driver's side of the base section of the ladder
- One (1) shall be mounted on the passenger's side of the base section of the ladder
- One (1) shall be mounted high on the driver's side tip of aerial
- One (1) shall be mounted high on the passenger's side tip of aerial
- One (1) shall be mounted low on the driver's side tip of the aerial
- One (1) shall be mounted low on the passenger's side tip of the aerial
The painted parts of this light assembly to be white.

Power to the "tracking lights" shall be controlled by an on/off switch at the turntable control operator's position.

The lights at the tip shall be controlled by turntable only.

LIGHTING ON AERIAL LADDER
There shall be TecNiq, Model D02, LED rung lighting provided on both sides of the aerial ladder base, lower and upper mid, and fly sections. The lighting shall be located adjacent to the ladder rungs along the lower rail of the ladder sections and shall run the length of the ladder section.

The color of the sections shall be:

- The base section of the ladder to be red.
- The lower mid section of the ladder to be white.
- The upper mid section of the ladder to be white.
- The fly section of the ladder to be blue.

The LED rung lighting shall be activated when a switch at the turntable operator's panel is activated through the master battery switch.

The lights may be load managed when the parking brake is applied.

STABILIZER WARNING LIGHTS
There shall be two (2) Whelen, Model M6*C, LED flashing warning lights with Whelen, Model M6FC, chrome flanges installed on the stabilizer cover panels, one (1) each side.

The rear stabilizer pan lights shall be red LED with a clear lens.

These warning lights shall be activated by the same switch as the side warning lights.

STABILIZER BEAM WARNING LIGHTS
There shall be two (2) Whelen®, Model T0R00FRR, 2.00" round red LED flashing lights mounted on each stabilizer, one (1) facing forward and one (1) facing rearward.

The lights shall be recessed in the horizontal beam of the stabilizer.

These warning lights shall be activated with the aerial master switch.

120-VOLT RECEPTACLE AT TIP
A 120-volt, 15 amp, twist lock receptacle, with weatherproof cover shall be provided at the tip of the aerial device.
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<table>
<thead>
<tr>
<th>2-WAY AERIAL COMMUNICATION SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>There shall be a Fire Research model ICA900-112 two-way intercom system provided. The control module shall be located on the turntable operator console, provided there is room, and have an LED volume display and push-button volume control.</td>
</tr>
<tr>
<td>A hands free module shall be located at the aerial tip or platform and constantly transmit to the other module unless the control module push-to-talk button is pressed.</td>
</tr>
<tr>
<td>Each intercom unit shall be weatherproof.</td>
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</tbody>
</table>

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<thead>
<tr>
<th>AERIAL PEDESTAL</th>
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<tbody>
<tr>
<td>The aerial pedestal shall accommodate the height of the cab.</td>
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<tr>
<th>LIFTING EYE - ROPE RESCUE ATTACHMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two (2) eyes shall be welded, one (1) to each ladder beam, at the ladder egress with a spreader bar to mounted between the eyes. This design shall distribute a load evenly across the ladder beams because of a single lifting eye on the spreader bar. The bar is retained by two (2) locking pins, one (1) at each end outboard of each eye. Leveling is maintained by the bar rotating in the eyes.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>SPECIAL COLOR, BOOM SUPPORT</th>
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<tbody>
<tr>
<td>The boom support shall be painted job color.</td>
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<thead>
<tr>
<th>AERIAL BOOM SUPPORT LIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>There shall be one (1) Whelen, Model 50C03ZCR, white LED light mounted in the boom support cradle.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>STABILIZER SCENE LIGHTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>There shall be one (1) Amdor LumaBar H2O, Model AY-9500-012, 12.00&quot; LED weatherproof strip light installed on each stabilizer to illuminate the surrounding area. A total of two (2) lights shall be provided.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>AERIAL TURNTABLE MANSAVER™ BARS</th>
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</thead>
<tbody>
<tr>
<td>ManSaver™ bars shall be installed at the aerial turntable.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>WATER SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A waterway system shall be provided consisting of the following components and features:</td>
</tr>
<tr>
<td>A 5.00&quot; pipe shall be connected to the water supply on one end and to a 5.00&quot; internal diameter water swivel at the rotation point of the turntable. The water swivel shall permit 360 degree continuous rotation of the aerial device.</td>
</tr>
</tbody>
</table>
The 5.00" waterway swivel is to be routed through the rotation point up to the heel pin swivel. The heel pin swivel shall allow the water to flow to the ladder pipe while elevating the aerial ladder from -10 degrees to 77 degrees. The heel pivot pin is not integral with the waterway swivel at any point. The design of the waterway shall allow complete servicing of the waterway swivel without disturbing the heel pivot pin.

The integral telescopic water system shall consist of a 4.50" diameter tube in the base section, a 4.00" diameter tube in the mid-section and a 3.50" diameter tube in the fly section. The telescopic waterway shall be constructed of anodized aluminum pipe.

The aerial shall be capable of discharging up to 1000 gpm at 100 psi parallel to the ladder and 90 degrees to each side of center while maintaining the 500lb tip load.

The aerial shall be capable of discharging between 1001 and up to 1500 gallons per minute at 100 psi parallel to the ladder and 40 degrees to each side of center while maintaining the 500lb tip load.

When the aerial device is positioned at -10 to 0 degrees of elevation, the master stream shall be capable of flow up to 30 degrees above horizontal.

An adjustable pressure relief valve shall be furnished to protect the aerial waterway from a pressure surge.

A 1.50" drain valve shall be located at the lowest point of the waterway system.

**WATERWAY SEALS**
The waterway seals shall be of type-B PolyPak design, composed of nitroxile seal and a nitrile wiper, which together offer maximum stability and extrusion resistance on the waterway. The seal shall be capable of withstanding pressures up to 2000 psi, temperatures in excess of 250 degrees Fahrenheit and have resistance to all foam generating solutions. The seals shall be internally lubricated.

The waterway seals shall have automatic centering guides constructed of synthetic thermalpolymer. The guides shall provide positive centering of the extendible sections within each other and the base section to insure longer service life and smoother operation.

**AERIAL MONITOR**
An Akron, model 3480 monitor with stow and deploy shall be provided at the tip with a Akron 1500 gpm Model 5178. This monitor shall allow for an additional 30 degrees of travel above horizontal at the aerial tip.
The monitor's functions shall be controlled electrically from two (2) separate locations. One (1) control shall be located at the control console and the other at the ladder tip.

There shall be a courtesy light at the tip of the aerial to illuminate the controls.

If the aerial has a quick-lock waterway, a limit switch shall be provided to disable the extended vertical travel when the monitor is locked to the lower ladder section.

**AERIAL WATERWAY FLOW METER**
Waterway flow, including total water flowed, shall be monitored by the microprocessor. An LCD display shall be located at the turntable control station.

**REAR INLET**
A 5.00" NST inlet to the aerial waterway shall be provided at the rear of the apparatus. The inlet shall have 5.00" aluminum plumbing. It shall be furnished with a 5.00" chrome plated adapter and a 5.00" chrome plated, long handle cap.

**WATERWAY LOCKING SYSTEM**
The aerial ladder waterway monitor shall be capable of being positioned at either the fly section or at the next lower section of the ladder.

The monitor location shall be changeable by the use of a single handle, located at the side of the ladder.

The handle, attached to a cam bracket, shall simply be moved forward to lock the monitor at the fly section and back to lock it to the previous section.

There shall be no pins to remove and reinstall.

The monitor shall be operational at all times, regardless of its position, without connecting or disconnecting electrical lines.

**TOOLS**
The following tools shall be provided for retorquing of all specified bolts as recommended by the manufacturer:

Torque Wrench

All Required Extensions, Sockets and Adapters

4-to-1 Multiplier
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**MANUALS**
Two (2) operator maintenance manuals and two (2) wiring diagrams pertaining to the aerial device shall be provided with the apparatus at time of pick-up.

**INITIAL INSTRUCTION**
On initial delivery of the fire apparatus, the contractor shall supply a qualified representative to demonstrate the apparatus and provide initial instruction to the fire department regarding the operation, care, and maintenance of the apparatus for a period of three (3) days.

**LOOSE EQUIPMENT**
The following equipment shall be furnished with the completed unit:

- One (1) bag of chrome, stainless steel, or cadmium plated screws, nuts, bolts and washers, as used in the construction of the unit

**THE FOLLOWING ITEMS TO BE INCLUDED**

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>RC50400-100</td>
<td>Key 5&quot; Pro-Flow Supply hose, 100' section (Rubber)</td>
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<tr>
<td>DP25800ECO</td>
<td>Key 2.5&quot; ECO 10 Polyester-Color</td>
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<tr>
<td>DP17800ECO</td>
<td>Key 1.75 ECO 10 Polyester-Color</td>
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<td>S54L545</td>
<td>Kochek 5&quot; Storz x 4-1/2&quot; Swivel LH Female</td>
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<tr>
<td>K48-3</td>
<td>Kochek spanner/hydrant wrench set</td>
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<tr>
<td>KS34</td>
<td>Kochek Storz Spanner Set</td>
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<td>70K60105</td>
<td>Kochek Piston Intake 6&quot; Female x 5&quot; Storz</td>
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<td>S54R525</td>
<td>Kochek 5&quot; Storz X 2 1/2&quot; NH swivel rocker female</td>
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<td></td>
<td>Bullard IR Camera ECLIPSE LDX w thermal throttle,</td>
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<td>truck charger, colorization, spot temp &amp; lanyard</td>
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<td>QRFS</td>
<td>Fire Hooks Hose Strap</td>
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<td>220-9888</td>
<td>Nylon 5' Speed Clip 2pc Black</td>
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<td>Salvage covers, 12' x 14' 10 oz vinyl</td>
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<td>Amerex A411 20# ABC Fire Extinguisher</td>
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<td>331</td>
<td>Amerex 15# CO2 Extinguisher</td>
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<td>700-024</td>
<td>Tempest DD-18-H 5.5 Direct Drive 18&quot; Fan</td>
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<td>810</td>
<td>20lb fire extinguisher brackets</td>
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<td>K5023</td>
<td>PAC Amkus ram bracket K5023</td>
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<tr>
<td>K5024</td>
<td>PAC Amkus Spreader bracket K5024</td>
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<td>90503</td>
<td>Streamlight Survivor LED Yellow</td>
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<tr>
<td>Phillips HeartstartFRx</td>
<td>Phillips FRx AED w/case, child key, 2 sets of pads. With extra battery</td>
<td>1</td>
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<tbody>
<tr>
<td>35R2525</td>
<td>2 1/2&quot; Double Swivel Rocker Lug Female</td>
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</tr>
<tr>
<td>36R2525</td>
<td>2 1/2&quot; NH Double Rocker Lug Male</td>
<td>3</td>
</tr>
<tr>
<td>37R2515</td>
<td>2 1/2&quot; NH Rigid Rocker Lug Female x 1 1/2&quot; NH Male</td>
<td>2</td>
</tr>
</tbody>
</table>

**NFPA REQUIRED LOOSE EQUIPMENT, PROVIDED BY FIRE DEPARTMENT**

The following loose equipment as outlined in NFPA 1901, 2009 edition, section 9.8.2 and 9.8.3 shall be provided by the fire department if not included in the above equipment list in these specifications. All loose equipment shall be installed on the apparatus before placed in emergency service, unless the fire department waives NFPA section 4.21.

- 800 ft (240 m) of 2.50" (65 mm) or larger fire hose, in any combination.
- 400 ft (120 m) of 1.50" (38 mm), 1.75" (45 mm), or 2.00" (52 mm) fire hose, in any combination.
- One (1) handline nozzle, 200 gpm (750 L/min) minimum.
- Two (2) handline nozzles, 95 gpm (360 L/min) minimum.
- One (1) playpipe with shutoff and 1.00" (25 mm), 1.125" (29 mm), and 1.25" (32 mm) tips.
- One (1) SCBA complying with NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*, for each assigned seating position, but not fewer than four (4), mounted in brackets fastened to the apparatus or stored in containers supplied by the SCBA manufacturer.
- One (1) spare SCBA cylinder for each SCBA carried, each mounted in a bracket fastened to the apparatus or stored in a specially designed storage space(s).
- One (1) first aid kit.
- One (1) double female 2.50" (65 mm) adapter with National Hose threads, mounted in a bracket fastened to the apparatus.
- One (1) double male 2.50" (65 mm) adapter with National Hose threads, mounted in a bracket fastened to the apparatus.
- One (1) rubber mallet, for use on suction hose connections, mounted in a bracket fastened to the apparatus.
- Four (4) ladder belts meeting the requirements of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.
- One (1) 150 ft (45 m) light-use life safety rope meeting the requirements of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*.
- One (1) 150 ft (45 m) general-use life safety rope meeting the requirements of NFPA 1983, *Standard on Fire Service Life Safety Rope and System Components*. 
One (1) traffic vest for each seating position, each vest to comply with ANSI/ISEA 207, *Standard for High Visibility Public Safety Vests*, and have a five-point breakaway feature that includes two (2) at the shoulders, two (2) at the sides, and one (1) at the front.

Five (5) fluorescent orange traffic cones not less than 28.00" (711 mm) in height, each equipped with a 6.00" (152 mm) retro-reflective white band no more than 4.00" (152 mm) from the top of the cone, and an additional 4.00" (102 mm) retro-reflective white band 2.00" (51 mm) below the 6.00" (152 mm) band.

Five (5) illuminated warning devices such as highway flares, unless the five (5) fluorescent orange traffic cones have illuminating capabilities.

One (1) automatic external defibrillator (AED).

If the supply hose carried does not use sexless couplings, an additional double female adapter and double male adapter, sized to fit the supply hose carried, shall be carried mounted in brackets fastened to the apparatus.

If none of the pump intakes are valved, a hose appliance that is equipped with one or more gated intakes with female swivel connection(s) compatible with the supply hose used on one side and a swivel connection with pump intake threads on the other side shall be carried. Any intake connection larger than 3.00" (75 mm) shall include a pressure relief device that meets the requirements of 16.6.6.

If the apparatus does not have a 2.50" National Hose (NH) intake, an adapter from 2.50" NH female to a pump intake shall be carried, mounted in a bracket fastened to the apparatus if not already mounted directly to the intake.

If the supply hose carried has other than 2.50" National Hose (NH) threads, adapters shall be carried to allow feeding the supply hose from a 2.50" NH thread male discharge and to allow the hose to connect to a 2.50" NH female intake, mounted in brackets fastened to the apparatus if not already mounted directly to the discharge or intake.

**SOFT SUCTION HOSE, PROVIDED BY FIRE DEPARTMENT**

NFPA 1901, 2009 edition, section 9.7.2 requires a minimum of 20 ft of suction hose or 15 ft of supply hose.

Hose is not on the apparatus as manufactured. The fire department shall provide suction or supply hose.

**DRY CHEMICAL EXTINGUISHER, PROVIDED BY FIRE DEPARTMENT**

NFPA 1901, 2009 edition, section 9.8.3 requires one (1) approved dry chemical portable fire extinguisher with a minimum 80-B:C rating mounted in a bracket fastened to the apparatus.

The extinguisher is not on the apparatus as manufactured. The fire department shall provide and mount the extinguisher.
WATER EXTINGUISHER, PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, section 9.8.3 requires one (1) 2.5 gallon or larger water extinguisher mounted in a bracket fastened to the apparatus.

The extinguisher is not on the apparatus as manufactured. The fire department shall provide and mount the extinguisher.

FLATHEAD AXE, PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, Section 9.8.3 requires one (1) flathead axe mounted in a bracket fastened to the apparatus.

The axe is not on the apparatus as manufactured. The fire department shall provide and mount the axe.

PICKHEAD AXE, PROVIDED BY FIRE DEPARTMENT
NFPA 1901, 2009 edition, Section 9.8.3 requires one (1) pickhead axe mounted in a bracket fastened to the apparatus.

The axe is not on the apparatus as manufactured. The fire department shall provide and mount the axe.

PAINT
The exterior custom cab and body painting procedure shall consist of a seven (7) step finishing process as follows:

1. **Manual Surface Preparation** - All exposed metal surfaces on the custom cab and body shall be thoroughly cleaned and prepared for painting. Imperfections on the exterior surfaces shall be removed and sanded to a smooth finish. Exterior seams shall be sealed before painting. Exterior surfaces that shall not be painted include; chrome plating, polished stainless steel, anodized aluminum and bright aluminum treadplate.

2. **Chemical Cleaning and Pretreatment** - All surfaces shall be chemically cleaned to remove dirt, oil, grease, and metal oxides to ensure the subsequent coatings bond well. The aluminum surfaces shall be properly cleaned and treated using a high pressure, high temperature 4 step Acid Etch process. The steel and stainless surfaces shall be properly cleaned and treated using a high temperature 3 step process specifically designed for steel or stainless. The chemical treatment converts the metal surface to a passive condition to help prevent corrosion. A final pure water rinse shall be applied to all metal surfaces.

3. **Surfacer Primer** - The Surfacer Primer shall be applied to a chemically treated metal surface to provide a strong corrosion protective basecoat. A minimum thickness of 2 mils of Surfacer Primer is applied to surfaces that require a Critical aesthetic finish. The
Surfacер Primer is a two-component high solids urethane that has excellent sanding properties and an extra smooth finish when sanded.

4. **Finish Sanding** - The Surfacer Primer shall be sanded with a fine grit abrasive to achieve an ultra-smooth finish. This sanding process is critical to produce the smooth mirror like finish in the topcoat.

5. **Sealer Primer** - The Sealer Primer is applied prior to the Basecoat in all areas that have not been previously primed with the Surfacer Primer. The Sealer Primer is a two-component high solids urethane that goes on smooth and provides excellent gloss hold out when topcoated.

6. **Basecoat Paint** - Two coats of a high performance, two component high solids polyurethane basecoat shall be applied. The Basecoat shall be applied to a thickness that shall achieve the proper color match. The Basecoat shall be used in conjunction with a urethane clear coat to provide protection from the environment.

7. **Clear Coat** - Two (2) coats of Clear Coat shall be applied over the Basecoat color. The Clear Coat is a two-component high solids urethane that provides superior gloss and durability to the exterior surfaces. Lap style and roll-up doors shall be Clear Coated to match the body. Paint warranty for the roll-up doors shall be provided by the roll-up door manufacture.

All removable items such as brackets, compartment doors, door hinges, and trim shall be removed and separately if required, to ensure paint behind all mounted items. Body assemblies that cannot be finish painted after assembly shall be finish painted before assembly.

The cab shall be two-tone, with the upper section painted white 10 along with a shield design on the cab face and lower section of the cab and body painted red 90. The special shield shall be located front over grill than the standard shield.

**PAINT - ENVIRONMENTAL IMPACT**
Contractor shall meet or exceed all current State regulations concerning paint operations. Pollution control shall include measures to protect the atmosphere, water and soil. Controls shall include the following conditions:

- Topcoats and primers shall be chrome and lead free.
- Metal treatment chemicals shall be chrome free. The wastewater generated in the metal treatment process shall be treated on-site to remove any other heavy metals.
- Particulate emission collection from sanding operations shall have a 99.99% efficiency factor.
Particulate emissions from painting operations shall be collected by a dry filter or water wash process. If the dry filter is used, it shall have an efficiency rating of 98.00%. Water wash systems shall be 99.97% efficient.

Water from water wash booths shall be reused. Solids shall be removed on a continual basis to keep the water clean.

Paint wastes are disposed of in an environmentally safe manner.

Empty metal paint containers shall be to recover the metal.

Solvents used in clean-up operations shall be recycled on-site or sent off-site for distillation and returned for reuse.

Additionally, the finished apparatus shall not be manufactured with or contain products that have ozone depleting substances. Contractor shall, upon demand, present evidence that the manufacturing facility meets the above conditions and that it is in compliance with his State EPA rules and regulations.

**PAINT CHASSIS FRAME ASSEMBLY**

The chassis frame assembly shall be painted black before the installation of the cab and body, and before installation of the engine and transmission assembly, air brake lines, electrical wire harnesses, etc.

Components that are included with the chassis frame assembly that shall be painted are:

- Frame rails
- Frame liners
- Cross members
- Axles
- Suspensions
- Steering gear
- Battery boxes
- Bumper extension weldment
- Frame extensions
- Body mounting angles
- Rear Body support substructure (front and rear)
- Pump house substructure
- Air tanks
- Fuel tank
- Castings
- Individual piece parts used in chassis and body assembly
Components treated with epoxy E-coat protection prior to paint:

- Two (2) C-channel frame rails
- Two (2) frame liners

The E-coat process shall meet the technical properties shown.

**PAINT, FRONT AND REAR WHEELS**
All wheel surfaces, inside and outside, shall be provided with powder coat paint #90 red.

**COMPARTMENT INTERIOR PAINT**
The interior of compartmentation shall be painted with a gray spatter type paint.

**AERIAL DEVICE PAINT COLOR**
The stabilizer beams, pedestal and torque box shall be treated with epoxy E-coat prior to painting to help provide resistance to corrosion and chemicals.

1. **Manual Surface Preparation** - All exposed metal surfaces on the aerial device structural components above the rotation point shall be thoroughly cleaned and mechanically shot-blasted to remove metal impurities and prepare the aerial for painting.

2. **Primer/Surfacer Coats** - A two (2) component urethane primer/surfacer shall be hand applied to the chemically treated metal surfaces to provide a strong corrosion protective base coat and to smooth out the surface. All seams shall be caulked before painting.

3. **Hand Sanding** - The primer/surfacer coat shall be lightly sanded to an ultra smooth finish.

4. **Sealer Primer Coat** - A two (2) component sealer primer coat shall be applied over the sanded primer.

5. **Topcoat Paint** - Urethane base coat shall be applied to opacity for correct color matching.

6. **Clearcoat** - Two (2) coats of an automotive grade two (2) component urethane shall be applied.

Surfaces that shall not be painted include all chrome plated, polished stainless steel, anodized aluminum and bright aluminum treadplate.

All buy out components, such as monitor, nozzle, gauges, etc. shall be supplied as received from the vendor.

Removable items such as brackets shall be removed and painted separately to ensure paint coverage behind all mounted items.
The aerial device (turntable and ladder sections) shall be painted white using the six (6) step finishing process. The support structure, rotation motor, components below the rotation point and the stabilizers shall be cleaned, caulked, primed and painted high gloss black.

The stabilizer beams, pedestal and torque box (including water tank cradle) shall be treated with epoxy E-coat prior to painting to help provide resistance to corrosion and chemicals.

The tip of the ladder shall be painted a contrasting color for high visibility.

**REFLECTIVE STRIPES**

Three (3) reflective stripes shall be provided across the front of the vehicle and along the sides of the body. The reflective band shall consist of a 1.00" white stripe at the top with a 1.00" gap then a 4.00" gold stripe with a 1.00" gap and a 1.00" white stripe on the bottom.

**REFLECTIVE STRIPE ON CAB FACE**

The reflective band provided on the cab face shall be located below the stainless steel trim band and above the front bumper.

**REAR CHEVRON STRIPING**

There shall be alternating chevron striping located on the rear-facing vertical surface of the apparatus. Covered surfaces shall include the rear wall and aluminum doors. Roll up doors and stainless steel access doors shall not be covered in chevron.

The colors shall be red and yellow diamond grade.

Each stripe shall be 6.00" in width.

This shall meet the requirements of NFPA 1901, 2009 edition, which states that 50% of the rear surface shall be covered with chevron striping.

**REFLECTIVE STRIPE ON STABILIZERS, IPOS**

There shall be 4.00" wide alternating fluorescent yellow green diamond grade and ruby red reflective chevron stripes provided on the forward and rear facing sides of both aerial stabilizers. The stripes shall be angled at a 45 degree angle.

**JOG(S) IN REFLECTIVE BAND**

The reflective band located on each side of the apparatus body shall contain one (1) jog(s) and shall be angled at approximately a 45 degrees when installed.

**INVERTED "V" CHEVRON STRIPING ON CAB AND CREW CAB DOORS**

There shall be alternating chevron striping located on the inside of each cab and crew cab door.
The striping shall consist of the following colors:

The first color shall be red diamond grade
The second color shall be yellow diamond grade
The size of the striping shall be 2.00".

**BODY STRIPE**
There shall be a genuine gold leaf stripe provided on each side of the body, over the fender.

**CAB STRIPE**
There shall be a genuine gold leaf stripe provided on both sides of the cab in place of the chrome molding and on the cab face with shield.

**CAB STRIPE**
There shall be a genuine gold leaf stripe on each side of the cab over the fender.

**LETTERING**
The lettering shall be totally encapsulated between two (2) layers of clear vinyl.

**LETTERING**
Forty-one (41) to sixty (60) genuine gold leaf lettering, 3.00" high, with outline and shade shall be provided.

**LETTERING**
There shall be reflective lettering, 10.00" high, with outline and shade provided. There shall be three (3) letters provided.

**LETTERING**
One (1) to twenty (20) printed effect gold leaf lettering, 8.00" high, with outline and shade shall be provided.

**LETTERING**
There shall be reflective lettering, 5.00" high, with outline and shade provided. There shall be 16 letters provided.

**LETTERING**
There shall be reflective lettering, 4.00" high, with outline and shade provided. There shall be 23 letters provided.
CAB GRILLE DESIGN
An American flag design shall be painted on the cab grille.

EAGLE #1 EMBLEMS
A pair of emblems, 18.00" to 24.00" in featuring an "Eagle in Flight", shall be installed on side body door. The design shall be color imaged.

EMBLEMS
There shall be a pair of 14.00" goldleaf/vinyl color emblems featuring a shield.

Location on cab doors to be determined.

FIRE APPARATUS PARTS CD MANUAL
There shall be two (2) custom parts manuals for the complete fire apparatus provided in CD format with the completed unit.

The manuals shall contain the following:

- Job number
- Part numbers with full descriptions
- Table of contents
- Parts section sorted in functional groups reflecting a major system, component, or assembly
- Parts section sorted in alphabetical order
- Instructions on how to locate parts

The manuals shall be specifically written for the chassis and body model being purchased. It shall not be a generic manual for a multitude of different chassis and bodies.

SERVICE PARTS INTERNET SITE
The service parts information included in these manuals are also available on the factory website. The website offers additional functions and features not contained in this manual, such as digital photographs and line drawings of select items. The website also features electronic search tools to assist in locating parts quickly.

CHASSIS SERVICE CD MANUALS
There shall be two (2) CD format chassis service manuals containing parts and service information on major components provided with the completed unit.

The manual shall contain the following sections:
The manual shall be specifically written for the chassis model being purchased. It shall not be a generic manual for a multitude of different chassis and bodies.

**CHASSIS OPERATION CD MANUALS**
There shall be two (2) CD format chassis operation manuals provided.

**ONE (1) YEAR MATERIAL AND WORKMANSHIP**
Each new piece of apparatus shall be provided with a minimum one (1) year basic apparatus material and workmanship limited warranty. The warranty shall cover such portions of the apparatus built by the manufacturer as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**THREE (3) YEAR MATERIAL AND WORKMANSHIP**
The new chassis shall be provided with a three (3) year material and workmanship limited warranty. The warranty shall cover such portions of the chassis built by the manufacturer as being free from structural failures caused by defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**ENGINE WARRANTY**
A Detroit Diesel five (5) year limited engine warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package.
STEERING GEAR WARRANTY
A Sheppard three (3) year limited steering gear warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package.

FIFTY (50) YEAR STRUCTURAL INTEGRITY
The chassis frame and crossmembers shall be provided with a fifty (50) year material and workmanship limited warranty. The warranty shall cover the chassis frame and crossmembers as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

FRONT AXLE THREE (3) YEAR MATERIAL AND WORKMANSHIP WARRANTY
Independent front suspension shall be provided with a three (3) year material and workmanship limited warranty. The manufacturer's warranty shall provide that the independent front suspension and steering gears be free from any defect related to material and workmanship on the portion of the apparatus built by the manufacturer that would arise under normal use and service. A copy of the warranty certificate shall be submitted with the bid package (no exception).

REAR AXLE TWO (2) YEAR MATERIAL AND WORKMANSHIP WARRANTY
A Meritor™ Axle two (2) year limited warranty shall be provided.

ABS BRAKE SYSTEM THREE (3) YEAR MATERIAL AND WORKMANSHIP WARRANTY
A Meritor Wabco™ ABS brake system three (3) year limited warranty shall be provided.

TEN (10) YEAR STRUCTURAL INTEGRITY
The new cab shall be provided with a ten (10) year material and workmanship limited warranty. The warranty shall cover such portions of the cab built by the manufacturer as being free from structural failures caused by defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

TEN (10) YEAR PRO-RATED PAINT AND CORROSION
Each new piece of apparatus shall be provided with a ten (10) year pro-rated paint and corrosion limited warranty on the apparatus cab. The warranty shall cover painted exterior surfaces of the body to be free from blistering, peeling, corrosion, or any other adhesion defect caused by defective manufacturing methods or paint material selection that would arise under normal use and service.
A copy of the warranty certificate shall be submitted with the bid package (no exception).

**FIVE (5) YEAR MATERIAL AND WORKMANSHIP**
The electronic modules and display(s) shall be provided with a five (5) year material and workmanship limited warranty. The warranty shall cover electronic modules to be free from failures caused by defects in material and workmanship.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**TRANSMISSION WARRANTY**
The transmission shall have a five (5) year/unlimited mileage warranty covering 100 percent parts and labor. The warranty is to be provided by Allison Transmission and not the apparatus builder.

**TRANSMISSION COOLER WARRANTY**
The transmission cooler shall carry a five (5) year parts and labor warranty (exclusive to the transmission cooler). In addition, a collateral damage warranty shall also be in effect for the first three (3) years of the warranty coverage and shall not exceed $10,000 per occurrence. A copy of the warranty certificate shall be submitted with the bid package.

**WATER TANK WARRANTY**
The UPF poly water tank shall be provided with a lifetime material and workmanship limited warranty.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**TEN (10) YEAR STRUCTURAL INTEGRITY**
Each new piece of apparatus shall be provided with a ten (10) year material and workmanship limited warranty on the apparatus body. The warranty shall cover such portions of the apparatus built by the manufacturer as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**PUMP WARRANTY**
The Waterous pump shall be provided with a five (5) year material and workmanship limited warranty.

A copy of the warranty certificate shall be submitted with the bid package (no exception).
TEN (10) YEAR PUMP PLUMBING WARRANTY
The stainless steel plumbing components and ancillary brass fittings used in the construction of the water/foam plumbing system shall be warranted for a period of ten (10) years or 100,000 miles. This covers structural failures caused by defective design or workmanship, or perforation caused by corrosion, provided the apparatus is used in a normal and reasonable manner. This warranty is extended only to the original city for a period of ten years from the date of delivery.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

TWENTY (20) YEAR AERIAL DEVICE STRUCTURAL INTEGRITY WARRANTY
The aerial device shall be provided with a twenty (20) year material and workmanship limited warranty. The warranty shall cover such portions of the apparatus built by the manufacturer as being free from defects in material and workmanship that would arise under normal use and service. This warranty shall be limited to the torque box, turntable, aerial sections and other structural components.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

AERIAL SWIVEL WARRANTY
An Amity five (5) year limited swivel warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package (no exception).

HYDRAULIC SYSTEM COMPONENTS WARRANTY
Aerial hydraulic system components shall be provided with a five (5) year material and workmanship limited warranty.

HYDRAULIC SEAL WARRANTY
Aerial hydraulic seals shall be provided with a three (3) year material and workmanship limited warranty.

A copy of the warranty certificates shall be submitted with the bid package (no exception).

AERIAL WATERWAY WARRANTY
An Amity ten (10) year limited waterway warranty shall be provided. A copy of the warranty certificate shall be submitted with the bid package (no exception).

FOUR (4) YEAR PRO-RATED PAINT AND CORROSION
The aerial device shall be provided with a four (4) year pro-rated paint and corrosion limited warranty. The warranty shall cover exterior painted surfaces of the aerial device to be free from blistering, peeling, corrosion, or any other adhesion defect caused by defective manufacturing methods or paint material selection that would arise under normal use and service.
A copy of the warranty certificate shall be submitted with the bid package (no exception).

**SIX (6) YEAR GENERATOR MATERIAL AND WORKMANSHIP WARRANTY**
A Harrison Hydra-Gen generator **six (6) year** limited warranty shall be provided.

**TEN (10) YEAR PRO-RATED PAINT AND CORROSION**
Each new piece of apparatus shall be provided with a **ten (10) year** pro-rated paint and corrosion limited warranty on the apparatus body. The warranty shall cover painted exterior surfaces of the body to be free from blistering, peeling, corrosion, or any other adhesion defect caused by defective manufacturing methods or paint material selection that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**THREE (3) YEAR MATERIAL AND WORKMANSHIP**
The gold leaf lamination shall be provided with a **three (3) year** material and workmanship limited warranty. The warranty shall cover the gold leaf lamination as being free from defects in material and workmanship that would arise under normal use and service.

A copy of the warranty certificate shall be submitted with the bid package (no exception).

**VEHICLE STABILITY CERTIFICATION**
The fire apparatus manufacturer shall provide a certification stating the apparatus complies with NFPA 1901, current edition, section 4.13, Vehicle Stability. The certification shall be provided at the time of bid.

**ENGINE INSTALLATION CERTIFICATION**
The fire apparatus manufacturer shall provide a certification, along with a letter from the engine manufacturer stating they approve of the engine installation in the bidder's chassis. The certification shall be provided at the time of bid.

**POWER STEERING CERTIFICATION**
The fire apparatus manufacturer shall provide a certification stating the power steering system as installed meets the requirements of the component supplier. The certification shall be provided at the time of bid.

**CAB INTEGRITY CERTIFICATION**
The fire apparatus manufacturer shall provide a cab integrity certification with this proposal. The certification shall state that the cab has been tested and certified by an independent third-party test facility. Testing events shall be documented with photographs, real-time and high-speed video, vehicle accelerometers, cart accelerometers, and a laser speed trap. The fire
apparatus manufacturer shall provide a state-licensed professional engineer to witness and certify all testing events. Testing shall meet or exceed the requirements below:

- European Occupant Protection Standard ECE Regulation No.29.
- SAE J2422 Cab Roof Strength Evaluation - Quasi-Static Loading Heavy Trucks.
- SAE J2420 COE Frontal Strength Evaluation - Dynamic Loading Heavy Trucks.

**Roof Crush**
The cab shall be subjected to a roof crush force of 22,050 lb. This value meets the ECE 29 criteria and is equivalent to the front axle rating up to a maximum of 10 metric tons.

**Additional Roof Crush**
The same cab shall be subjected to a roof crush force of 100,000 lbs. This value exceeds the ECE 29 criteria by nearly 4.5 times.

**Side Impact**
The same cab shall be subjected to dynamic preload where a 13,275 lb moving barrier slams into the side of the cab at 5.5 mph at a force of 13,000 ft-lbs. This test is part of the SAE J2422 test procedure and more closely represents the forces a cab shall see in a rollover incident.

**Frontal Impact**
The same cab shall withstand a frontal impact of 32,600 ft-lbs of force using a moving barrier in accordance with SAE J2420.

**Additional Frontal Impact**
The same cab shall withstand a frontal impact of 65,200 ft-lbs of force using a moving barrier, (twice the force required by SAE J2420).

The same cab shall withstand all tests without any measurable intrusion into the survival space of the occupant area.

There shall be no exception to any portion of the cab integrity certification. Nonconformance shall lead to immediate rejection of bid.

**CAB DOOR DURABILITY CERTIFICATION**
Robust cab doors help protect occupants. Cab doors shall survive a 200,000 cycle door slam test where the slamming force exceeds 20 G's of deceleration. The bidder shall certify that the sample doors similar to those provided on the apparatus have been tested and have met these criteria without structural damage, latch malfunction, or significant component wear.
WINDSHIELD WIPER DURABILITY CERTIFICATION
Visibility during inclement weather is essential to safe apparatus performance. Windshield wipers shall survive a 3 million cycle durability test in accordance with section 6.2 of SAE J198 Windshield Wiper Systems - Trucks, Buses and Multipurpose Vehicles. The bidder shall certify that the wiper system design has been tested and that the wiper system has met these criteria.

ELECTRIC WINDOW DURABILITY CERTIFICATION
Cab window roll-up systems can cause maintenance problems if not designed for long service life. The window regulator design shall complete 30,000 complete up-down cycles and still function normally when finished. The bidder shall certify that sample doors and windows similar to those provided on the apparatus have been tested and have met these criteria without malfunction or significant component wear.

SEAT BELT ANCHOR STRENGTH
Seat belt attachment strength is regulated by Federal Motor Vehicle Safety Standards and should be validated through testing. Each seat belt anchor design shall withstand 3000 lb of pull on both the lap and shoulder belt in accordance with FMVSS 571.210 Seat Belt Assembly Anchorages. The bidder shall certify that each anchor design was pull tested to the required force and met the appropriate criteria.

SEAT MOUNTING STRENGTH
Seat attachment strength is regulated by Federal Motor Vehicle Safety Standards and should be validated through testing. Each seat mounting design shall be tested to withstand 20 G's of force in accordance with FMVSS 571.207 Seating Systems. The bidder shall certify that each seat mount and cab structure design was pull tested to the required force and met the appropriate criteria.

CAB DEFROSTER CERTIFICATION
Visibility during inclement weather is essential to safe apparatus performance. The defroster system shall clear the required windshield zones in accordance with SAE J381 Windshield Defrosting Systems Test Procedure And Performance Requirements - Trucks, Buses, And Multipurpose Vehicles. The bidder shall certify that the defrost system design has been tested in a cold chamber and passes the SAE J381 criteria.

CAB HEATER CERTIFICATION
Good cab heat performance and regulation provides a more effective working environment for personnel, whether in-transit, or at a scene. The cab heaters shall warm the cab 75 F from a cold-soak, within 30 minutes when tested using the coolant supply methods found in SAE J381. The bidder shall certify that a substantially similar cab has been tested and has met these criteria.
CAB AIR CONDITIONING PERFORMANCE CERTIFICATION
Good cab air conditioning temperature and air flow performance keeps occupants comfortable, reduces humidity, and provides a climate for recuperation while at the scene. The cab air conditioning system shall cool the cab from a heat-soaked condition at 100 degrees Fahrenheit to an average of 67 degrees Fahrenheit in 30 minutes. The bidder shall certify that a substantially similar air conditioning system has been tested and has met these criteria. The certification shall be available at the time of delivery.

AMP DRAW REPORT
The bidder shall provide, at the time of bid and delivery, an itemized print out of the expected amp draw of the entire vehicle's electrical system.

The manufacturer of the apparatus shall provide the following:

- Documentation of the electrical system performance tests.
- A written load analysis, which shall include the following:
  - The nameplate rating of the alternator.
  - The alternator rating under the conditions specified per:
    - Applicable NFPA 1901 or 1906 (Current Edition).
  - The minimum continuous load of each component that is specified per:
    - Applicable NFPA 1901 or 1906 (Current Edition).
  - Additional loads that, when added to the minimum continuous load, determine the total connected load.
  - Each individual intermittent load.

All of the above listed items shall be provided by the bidder per the applicable NFPA 1901 or 1906 (Current Edition).